CALICO RESOURCES USA CORP.
GRASSY MOUNTAIN MINE PROJECT
MALHEUR COUNTY, OREGON

TERRESTRIAL VEGETATION BASELINE REPORT

JANUARY 2018
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TERRESTRIAL VEGETATION BASELINE REPORT

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LIST OF ABBREVIATIONS AND ACRONYMS

amsl	above mean sea level
BLM	Bureau of Land Management
cm	centimeter
DOGAMI	Department of Geology and Mineral Industries
ESA	Endangered Species Act of 1972 as Amended
GPS	Global Positioning System
HDR	HDR Engineering, Inc.
IPaC	Information for Planning and Consultation
N	North
OAR	Oregon Administrative Rules
ODA	Oregon Department of Agriculture
ODFW	Oregon Department of Fish and Wildlife
ORBIC	Oregon Biodiversity Information Center
ORS	Oregon Revised Statutes
Project	Grassy Mountain Mine Project
TES	Threatened, Endangered, and Sensitive Species
USFWS	United States Fish and Wildlife Service
W	West

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GRASSY MOUNTAIN MINE PROJECT
TERRESTRIAL VEGETATION BASELINE REPORT

1 INTRODUCTION

The purpose of this terrestrial vegetation baseline study is to characterize existing conditions prior to the start of proposed mining operations at the Grassy Mountain Mine Project (Project), located in Malheur County, Oregon. This study characterizes the terrestrial vegetation communities, including species diversity; presence or absence of federally-listed threatened, endangered and sensitive (TES) species; presence or absence of Oregon and Bureau of Land Management (BLM) sensitive species; and presence of noxious weeds.

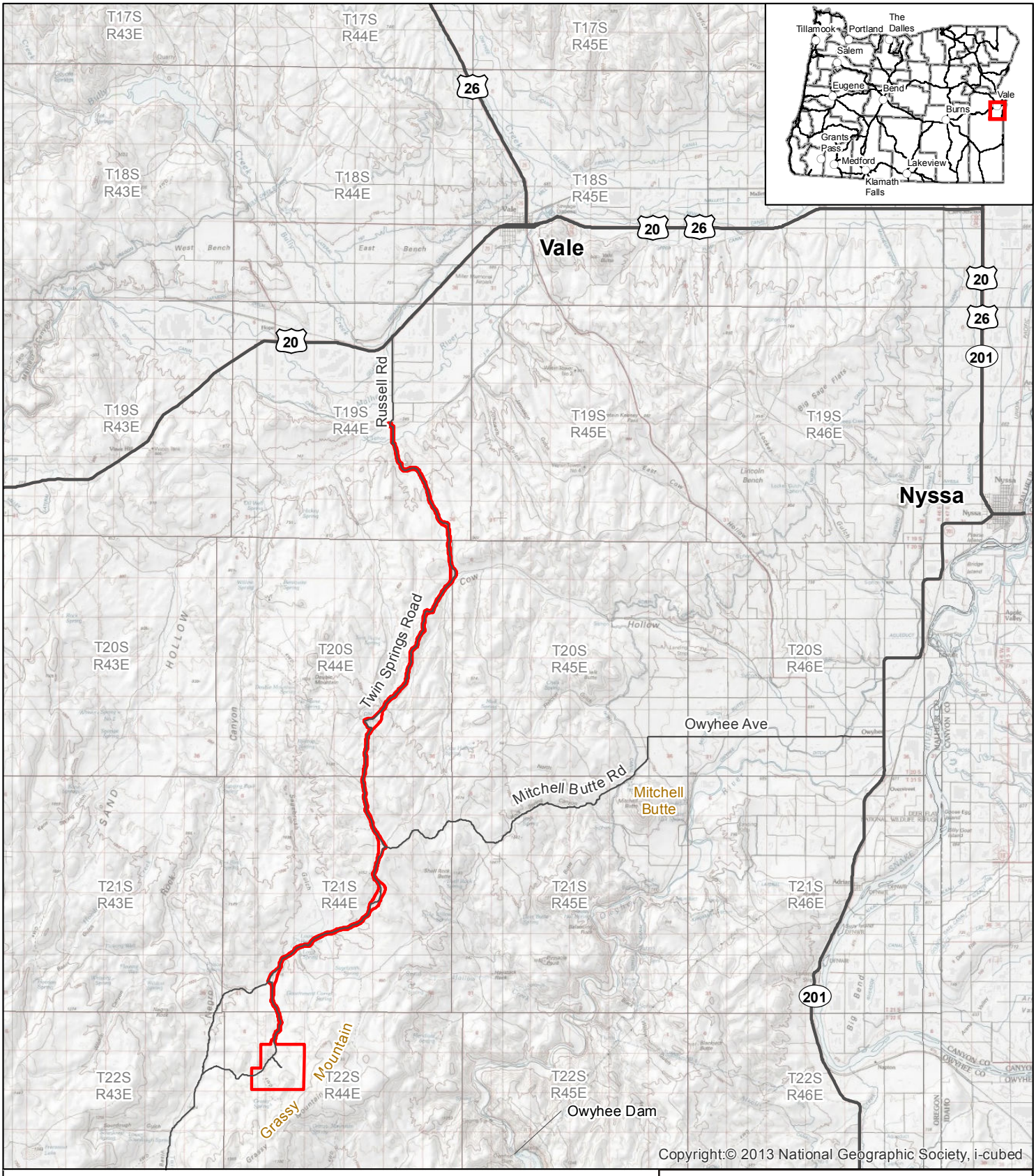
This terrestrial vegetation baseline study has been prepared to meet the following objectives:

- Clearly describe accepted field procedures, methodologies, and documentation requirements needed to characterize existing vegetation baseline conditions at the mine site and road access corridor, as well as the regional setting, as it relates to the predominant terrestrial vegetation communities.
- Describe methodology to inventory vegetation.
- Identify other current land uses which could affect the condition of existing terrestrial vegetation resources at the site (i.e., grazing).
- Survey and record potential threatened, endangered, candidate and sensitive plant species within the permit area.
- Survey for noxious weeds that occur in the permit area.
- Make recommendations for natural revegetation, wildlife habitat restoration, and reclamation at the end of the potential mine life.

A portion of the text and data used in this report has been incorporated from the May 2014 *Draft Terrestrial Vegetation Baseline Study* and the July 2015 *Draft Terrestrial Vegetation Baseline Study Addendum #1* prepared for the Project by HDR Engineering, Inc. (HDR), for previously surveyed areas in the current permit area; however, most of this report documents new survey results from a 2017 survey that occurred from a revision to the permit area. The 2014 and 2015 HDR reports are included as Attachment A. Based on comments received on the January 2018 version of this report from the Oregon Department of Fish and Wildlife (ODFW) and the Oregon Department of Geology and Mineral Industries (DOGAMI), plant collection of sagebrush in the area was conducted on September 18, 2018, and testing occurred on September 19, 2018. The methodology and results of this testing are described in a technical memorandum and included as Attachment B to this report.

2 RESOURCE STUDY AREA

The Project is located in Malheur County, Oregon, approximately 22 miles south-southwest of Vale (Figure 1) and consists of two areas: the Mine and Process Area, and the Access Road Area (Permit Area) (Figure 2).



Explanation

- Permit Area
- Existing Road

Projection: UTM Zone 11 North, NAD83, meters

0 5,000 10,000 15,000 20,000 Feet

0 1 2 3 4 Miles

N

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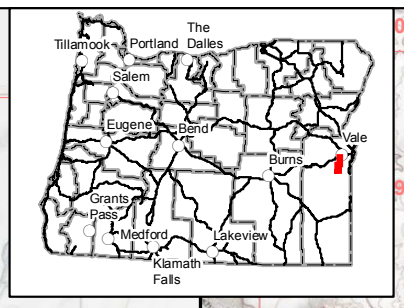
GRASSY MOUNTAIN MINE PROJECT

Location Map

Figure 1

Date: 12/19/2017	Drawn By: JDB
Revised:	Project No.: 3678
Base Map: USGS 100K quads: Boise, Brogan, Vale, Weiser	
File Name: 3678G_GrassyMtn_BL_Fig01_Location.mxd	

EM STRATEGIES



Russell Road

Twin Springs Road

Match Line

T19S R44E

T20S R44E

T21S R44E

T22S R44E

T20S R45E

Copyright:© 2013 National Geographic Society, i-cubed

Copyright:© 2013 National Geographic Society, i-cubed

Explanation

- Permit Area
- Mine and Process Area
- Access Road Area
- Patented Lode Claims
- Proposed Access Road
- Possible Road Realignment

Projection: UTM Zone 11 North, NAD83, meters

0 2,000 4,000 6,000 8,000 10,000 Feet

0 1 2 Miles

N

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GRASSY MOUNTAIN MINE PROJECT

Permit Area Map

Figure 2

Date:	12/19/2017	Drawn By:	JDB
Revised:		Project No.:	3678
Base Map:	USGS 7.5' quads: Double Mountain, Grassy Mountain, Kane Spring Gulch, Sourdough Spring, Vale West		
File Name:	3678G_GrassyMtn_BL_V_Fig02_PermitArea.mxd		

EM STRATEGIES

The Mine and Process Area is located on three patented lode mining claims and unpatented lode mining claims that cover an estimated 886 acres. These patented and unpatented lode mining claims are part of a larger land position that includes 419 unpatented lode mining claims and nine mill site claims on lands administered by the BLM (Figure 2). All proposed mining would occur on the patented claims, with some mine facilities on unpatented claims. The Mine and Process Area is in all or portions of Sections 5 through 8, Township 22 South, Range 44 East (T22S, R44E) (Willamette Meridian).

The Access Road Area is located on public land administered by the BLM, and private land controlled by others (Figure 2). A portion of the Access Road Area is a Malheur County Road named Twin Springs Road. The Access Road Area extends north from the Mine and Process Area to Russell Road, a paved Malheur County Road. The Access Road Area is in portions of Section 5, T22S, R44E, Sections 3, 10, 11, 14, 15, 21 through 23, 28, 29, and 32, T21S, R44E, Sections 1, 12 through 14, 23, 26, 27, and 34, T20S, R44E, Sections 6 and 7, T20S, R45E, and Sections 22, 23, 26, 35, and 36, T19S, R44E (Willamette Meridian). The width of the Access Road Area is 300 feet (150 feet on either side of the access road centerline) to accommodate possible minor widening or re-routing, and a potential powerline adjacent to the access road. There are several areas shown that are significantly wider than 300 feet on the Permit Area Map (Figure 2), which are areas where the final alignment has not yet been determined. The final engineering of the road will be consistent throughout, and within the Permit Area. The Access Road Area also includes a buffer on either side of the proposed road width for the collection of environmental baseline data. The road corridor will be 40 feet wide, which includes a 24-foot wide road travel width (12 feet on either side of the road centerline), four-foot wide shoulders on each side of the road, minimum one-foot wide ditches on each side of the road, and appropriate cut and fill. The Access Road Area totals approximately 876 acres.

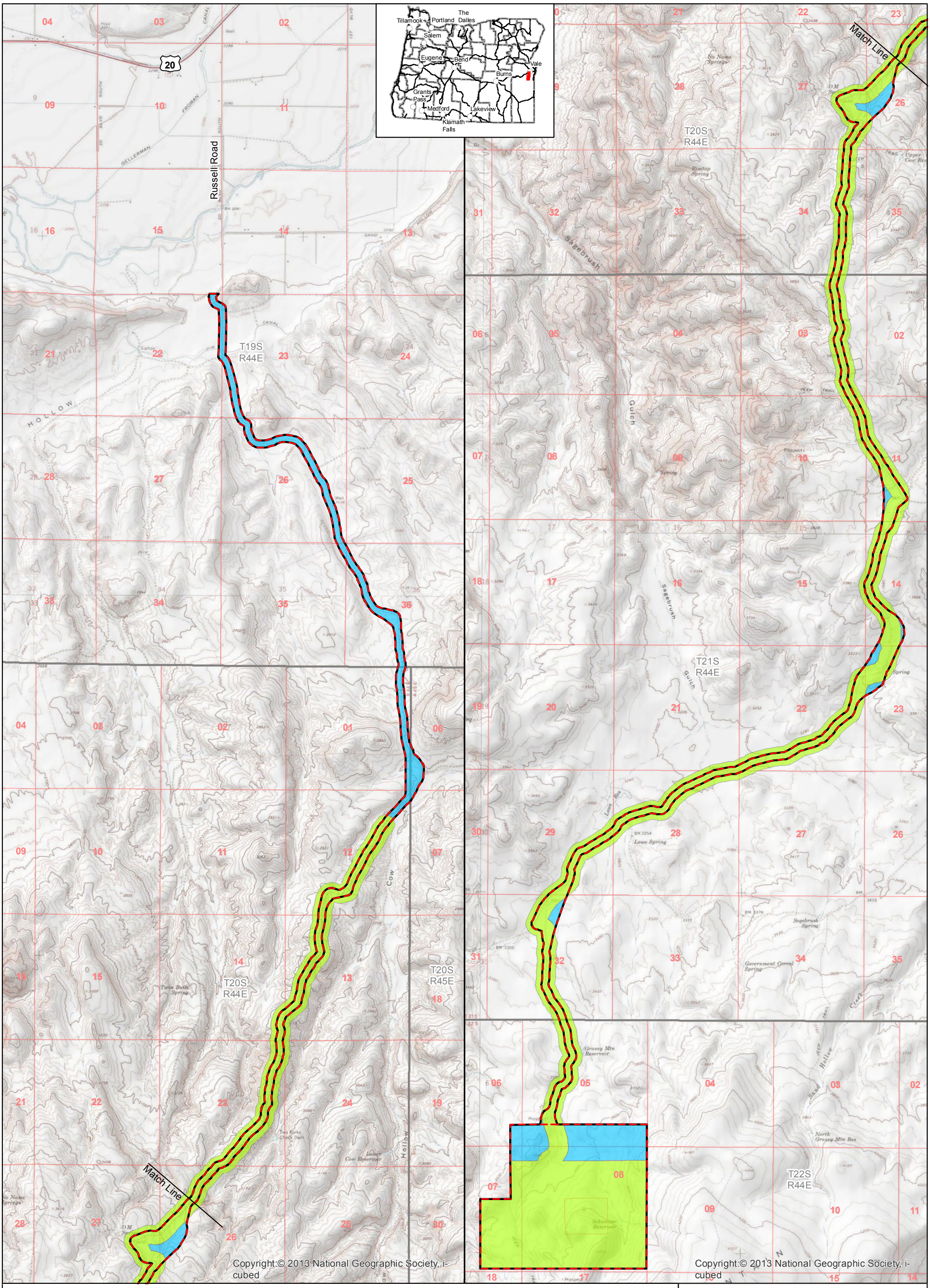
Vegetation has been previously characterized in the May 2014 HDR report and the July 2015 addendum for portions of the Mine and Process Area and the Access Road Area that are within the current Permit Area (HDR 2014/2015 Survey Area). The 2017 Vegetation Survey Area (2017 Survey Area) is limited to a total of approximately 415 acres in the Mine and Process Area and Access Road Area that were not previously studied and characterized. The two survey areas combined are the Terrestrial Vegetation Study Area (Study Area) (Figure 3).

3 REGULATORY FRAMEWORK

3.1 Federal

3.1.1 Noxious Weeds

The Federal Noxious Weed Act of 1974 (7 U.S.C. 2801-2813) as amended by Sec. 15, Management of Undesirable Plants on Federal Lands 1990 requires that each Federal Agency: 1) designate a lead office and person trained in the management of undesirable plants; 2) establish and fund an undesirable plant management program; 3) complete and implement cooperative agreements with State agencies; and 4) establish integrated management systems to control undesirable plant species.



Explanation

- Permit Area
- Terrestrial Vegetation Study Area
- 2017 Survey Area
- HDR 2014/2015 Survey Area

Projection: UTM Zone 11 North, NAD83, meters

0 2,000 4,000 6,000 8,000 10,000 Feet

0 1 2 Miles

N

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GRASSY MOUNTAIN MINE PROJECT

Terrestrial Vegetation Study Area and Survey Areas

Figure 3

Date: 12/19/2017	Drawn By: JDB
Revised:	Project No.: 3678
Base Map: USGS 7.5' quads: Double Mountain, Grassy Mountain, Kane Spring Gulch, Sourdough Spring, Vale West	
File Name: 3678G_GrassyMtn_BL_V_Fig03_StudyAreas.mxd	

EM STRATEGIES

The BLM defines a noxious weed as "any plant designated by a federal, state or county government as injurious to public health, agriculture, recreation, wildlife or property," and "invasive plants include not only noxious weeds, but also other plants that are not native to this country or to the area where they are growing" (BLM 2017). BLM Manual 9011 (*Chemical Pest Control*) (BLM 2007), BLM Handbook H-9011-1 (*Chemical Pest Control*) (BLM 1994), and BLM Manual 9014 (*Control Use of Biological Control Agents of Pests on Public Lands*) (BLM 1990) provide policy for the planning and implementation of biological controls within an integrated pest management program. These policies further require that all ground disturbing projects are evaluated to determine the risk of introducing or spreading noxious weeds.

3.1.2 United States Fish and Wildlife Service

The United States Fish and Wildlife Service (USFWS) is responsible for administering and implementing the Endangered Species Act of 1972 as Amended (ESA) to conserve, protect, and recover federally-listed species.

3.1.3 Bureau of Land Management

The BLM's policy for management of special status species is in the BLM Manual Section 6840 (*Special Status Species Management*) (BLM 2008). Special status species include the following:

- Federally-listed Threatened or Endangered Species: Any species the USFWS has listed as an endangered or threatened species under the ESA throughout all or a significant portion of its range;
- Proposed Threatened or Endangered Species: Any species the USFWS has proposed for listing as a federally endangered or threatened species under the ESA;
- Candidate Species: Plant and animal taxa under consideration for possible listing as threatened or endangered under the ESA;
- Delisted Species: Any species in the five years following their delisting;
- BLM Sensitive Species: Species designated as Sensitive by the BLM State Director because they meet the following criteria: Native species found on BLM-administered lands for which the BLM has the capability to significantly affect the conservation status of the species through management, and either: 1) there is information that a species has undergone, is undergoing, or is predicted to undergo a downward trend such that the viability of the species or a distinct population segment of the species is at risk across all or a significant portion of the species range; or 2) the species depends on ecological refugia or specialized or unique habitats on BLM-administered lands, and there is evidence that such areas are threatened with alteration such that the continued viability of the species in that area would be at risk (BLM 2008); and
- State of Oregon Listed Species: State-protected animals that have been determined to meet BLM's Manual 6840 policy definition.

It is BLM policy to provide sensitive species with the same level of protection that is given to federal candidate species. The major objective of this protection is to preclude the need for federal listing. The BLM resource management plans provide management direction for the many multiple uses, including outdoor recreation, range, timber, watershed, fish and wildlife, minerals,

wilderness, and cultural resources. A total of 139 plant species are considered special status for the Vale District of the BLM (Appendix A).

3.2 State

3.2.1 Oregon Administrative Rules

The environmental baseline data methodology for terrestrial vegetation resources was prepared to meet the requirements of Oregon Administrative Rules (OAR) 632-037-0055, 632-037-0040 and OAR 635, Division 420.

OAR 632, Division 037, Section 0130 Reclamation and Mine Closure Standards that pertain to revegetation include the following:

- Surface reclamation of a chemical process mine shall require certification by ODFW and the Oregon Department of Agriculture (ODA) that a self-sustaining ecosystem, comparable to undamaged ecosystems in the area, has been established to satisfy the permittee's habitat restoration obligations;

- Native species shall be established unless the use of non-native species is justified and approved by the technical review team;

- Seed mixtures, fertilizer rates, and other requirements will be derived from departmental experience and advice from such sources as ODA, Natural Resources Conservation Service (formerly U.S. Soil Conservation Service), Oregon State University Extension Service, the Oregon Department of Transportation, BLM, United States Forest Service, local soil conservation districts, and private sector experts;

- Establishment of a self-sustaining ecosystem, comparable to undamaged ecosystems in the area of the mine;

- Revegetation shall be considered successful if it is consistent with the establishment of a self-sustaining ecosystem, comparable to undamaged ecosystems in the area of the mine; and

- Vegetation test plots and chemical/physical soil and subsoil analysis may be required to insure establishment feasibility.

OAR 635, Division 420 rules prescribe the standards for the ODFW to review proposed chemical process mining operations for developing conditions for protection of wildlife and their habitat, to further the Wildlife Policy (Oregon Revised Statutes [ORS] 496.012 and Food Fish Management Policy (ORS 506.109) of the State of Oregon.

3.2.2 Oregon Endangered Species Act

The Oregon Department of Agriculture states the following:

> *Native plants that are listed as threatened or endangered in Oregon are protected on all non-federal public lands (state, county, city, etc.) under the Oregon Revised Statute (ORS) 564, commonly known as the Oregon Endangered Species Act. The Oregon Department of*

Agriculture is given the responsibility for conservation of native plants under the Oregon Administrative Rules (OAR) 603-073-0001. These rules outline the list of activities that require a listed plant permit in Oregon.

4 STUDY METHODOLOGY

The protocols for the field studies were established in the *Environmental Baseline Study Work Plans* (EM Strategies, Inc. 2017). The survey methodologies as they were applied in the field are summarized in this section.

4.1 Literature Review

A portion of the baseline characterization outlined in this report has been incorporated from the May 2014 and the July 2015 HDR reports (Attachment A). Prior to initiating the 2017 field surveys, the results of the literature review in the HDR reports were reviewed, and updated information on special status species occurrences was requested from the Oregon Biodiversity Information Center (ORBIC) and the USFWS. An updated list of Sensitive Species was requested from the BLM. A current list of noxious weeds for Malheur County, Oregon, was also obtained from the Malheur County Weed Advisory Board website.

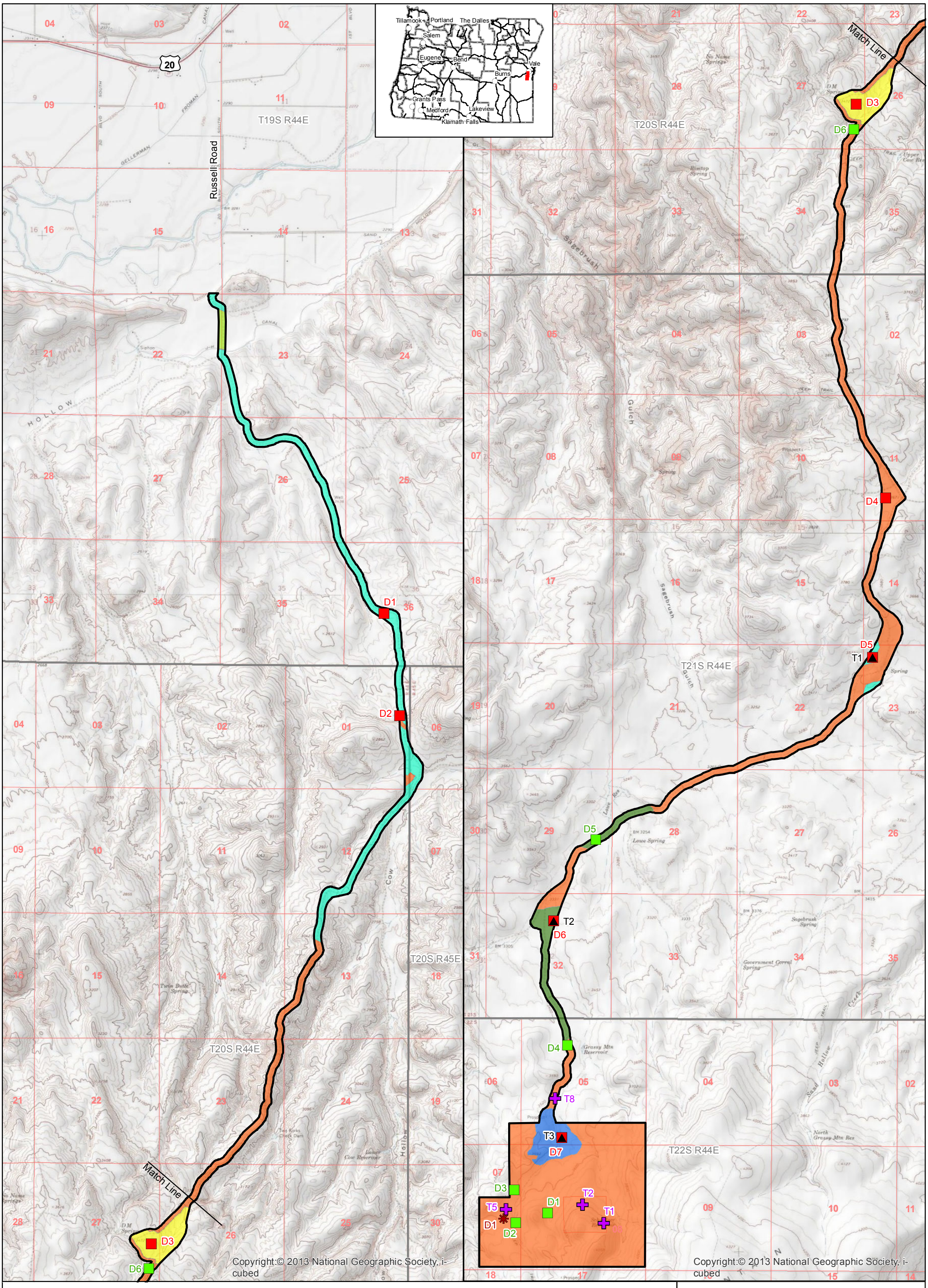
4.2 Field Studies

The 2017 vegetation survey was conducted over a three-day period from May 20 to May 22, 2017. The tasks performed during the survey were the same as those performed in the 2014 and 2015 surveys conducted by HDR. Based on comments received on the January 2018 version of this report from ODFW and DOGAMI, plant collection of sagebrush in the area was conducted on September 18, 2018, and testing occurred on September 19, 2018. The methodology and results of this testing are described in a technical memorandum and included as Attachment B to this report.

4.2.1 Vegetation Attributes

The Daubenmire method for sampling vegetation attributes consisted of systematically placing a 20-centimeter (cm) by 50-cm quadrant frame at 50 points along a 100-foot measuring tape and determining vegetation characteristics of canopy cover, frequency, and composition by canopy cover. The information collected in the field was recorded on standardized Daubenmire field forms. Seven Daubenmire transects were sampled (Figure 4). Global Positioning System (GPS) and photo points were established at each of the transects (Appendix B).

In addition, three ten-foot wide by ten-foot long vegetation plots were sampled to determine primary vegetation composition within three vegetation communities for the Mine and Process Area and the Access Road Area (Figure 4). GPS and photo points were established at each plot (Appendix B). Plants were classified by growth form (shrub, forb, grass), identified, and counted. Dominant and co-dominant species were identified.



Explanation

Permit Area

Field-Verified Vegetation Communities (2015 and 2017)

- Agricultural (11 acres)
- Bluebunch Wheatgrass/Cheatgrass/Annual (240 acres)
- Burned Yellow Rabbitbrush/Bluebunch Wheatgrass (60 acres)
- Crested Wheatgrass Seeding (80 acres)
- Wyoming Big Sagebrush/Bluebunch Wheatgrass (1,297 acres)
- Wyoming Big Sagebrush/Crested Wheatgrass (71 acres)

- Transect Location (2017)
- Daubenmire Location (2017)
- Daubenmire Location (2015, HDR)
- Daubenmire Location (2014, HDR)
- Transect Location (2014, HDR)

0 2,000 4,000 6,000 8,000 10,000 Feet

0 1 2 Miles

N

Projection: UTM Zone 11 North, NAD83, meters

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GRASSY MOUNTAIN MINE PROJECT

Field-Verified Vegetation Communities and Daubenmire and Plot Transect Locations

Figure 4

Date:	09/20/2018	Drawn By:	JDB
Revised:		Project No.:	3678
Base Map:	USGS 7.5' quads: Double Mountain, Grassy Mountain, Kane Spring Gulch, Sourdough Spring, Vale West		
File Name:	3678G_GrassyMtn_BL_V_Fig04_Transects.mxd		

EM STRATEGIES

4.2.1.1 Special Status Species

A survey was conducted within suitable habitat for any plant species with protected status; specifically, federally-listed or State-listed threatened or endangered species, and BLM Sensitive species.

4.2.1.2 Noxious Weeds

A list of noxious weeds for Malheur County, Oregon, was obtained from the Malheur County Weed Advisory Board website (Appendix C). Malheur County has prioritized control and/or eradication of noxious weeds by A, B, and C classes, with category A having the highest priority. A noxious weed inventory is the basis for the development of the Project's noxious weed control strategy and plan, which are key components of the overall plan of operations and part of the Division 37 process.

5 BASELINE CHARACTERIZATION

5.1 Plant Community Description

HDR (2014, 2015) mapped three vegetation communities within portions of the current Permit Area: annual grass; crested wheatgrass/annual grass; and sagebrush/bunchgrass. The 2017 baseline survey identified two additional plant communities in areas that were not previously surveyed within the revised Permit Area: Wyoming big sagebrush/crested wheatgrass and burned yellow rabbitbrush/bluebunch wheatgrass (Figure 4). A floral compendium is included in Appendix D.

Approximately 0.3 mile of the northern portion of the Access Road Area, or 11 acres, is irrigated agricultural row crops; these areas were not evaluated during the vegetation survey. Most of the vegetation within the Study Area is a desert-rangeland type where sagebrush and grasses are the dominant species. A large portion of the area has been impacted by grazing, fire, and range seeding programs. Cheatgrass (*Bromus tectorum*) was one of the dominant species in every plant community, likely due to disturbance from grazing and wildfire. Cattle and sheep were observed grazing at several locations within the 2017 Survey Area. Most grass species were fully emerged and spring flowering forb species were in peak bloom.

5.1.1 Wyoming Big Sagebrush/Crested Wheatgrass Community

The Wyoming big sagebrush/crested wheatgrass plant community occurs within the extreme southern portion of the 2017 Survey Area (Figure 4). It comprises approximately 71 acres of the Study Area. Bare ground within this community was estimated at five percent. Common shrub species observed within this community included Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) and yellow rabbitbrush (*Chrysothamnus viscidiflorus*). The understory is dominated by grass species, including cheatgrass, crested wheatgrass (*Agropyron cristatum*), Sandberg bluegrass (*Poa secunda*), and bluebunch wheatgrass. Forbs observed within this community included willow herb (*Epilobium* sp.), woollypod milkvetch (*Astragalus purshii*), and meadow deathcamas (*Zigadenus venenosus*). Photo Plate 1 (Appendix B) shows typical characteristics of the Wyoming big sagebrush/crested wheatgrass community.

5.1.2 Crested Wheatgrass Seeding Community

The crested wheatgrass seeding plant community occurred throughout portions of the Study Area in areas that were burned, and then seeded with crested wheatgrass (Figure 4). It comprises approximately 80 acres of the Study Area. Virtually no woody plant species are present in this community. Bare ground within this community was estimated at 40 percent. Dominant grasses were crested wheatgrass, cheatgrass, and Sandberg bluegrass. Photo Plate 2 (Appendix B) shows a typical crested wheatgrass seeding community.

5.1.3 Bluebunch Wheatgrass/Cheatgrass/Annual Community

The bluebunch wheatgrass/cheatgrass/annual plant community occurs mostly within northern portions of the Study Area where grazing is heaviest (Figure 4). It comprises approximately 240 acres of the Study Area. Soil in these areas is typically less rocky with 15 to 25 percent bare ground. The crested wheatgrass is likely a result of past seedings as reclamation from fire damage, and cheatgrass is prevalent throughout. Photo Plate 3 (Appendix B) shows a typical bluebunch wheatgrass (*Pseudoroegneria spicata* ssp. *spicata*)/cheatgrass/annual community.

5.1.4 Wyoming Big Sagebrush/Bluebunch Wheatgrass Community

The Wyoming big sagebrush/bluebunch wheatgrass plant community is the dominant plant community in the Study Area (Figure 4). It typifies areas where sagebrush survived wildfires. It comprises approximately 1,297 acres of the Study Area. Bare ground in these areas often ranges from 25 to 50 percent (HDR 2014). The shrub stratum was dominated by Wyoming big sagebrush, rubber rabbitbrush (*Chrysothamnus nauseosus*), and yellow rabbitbrush. The understory was dominated by grasses, including Sandberg bluegrass, Idaho fescue (*Festuca idahoensis*), and bluebunch wheatgrass with a cheatgrass mat (HDR 2014). Photo Plate 4 (Appendix B) shows a typical Wyoming big sagebrush/bluebunch wheatgrass community.

5.1.5 Burned Yellow Rabbitbrush/Bluebunch Wheatgrass Community

The burned yellow rabbitbrush/bluebunch wheatgrass plant community occurs in one area within the central portion of the Study Area (Figure 4). It comprises approximately 60 acres of the Study Area. This area was likely dominated by sagebrush communities before damage from wildfires. After seeding with crested wheatgrass, the shrub layer became dominated by yellow rabbitbrush. Topsoil erosion was evident in some areas, likely due to loss of vegetation after wildfires. The understory in these areas was dominated by grasses, including Sandberg bluegrass, bluebunch wheatgrass, and cheatgrass. Other grass species observed included squirreltail (*Elymus elymoides*) and stinkgrass (*Eragrostis cilianensis*). Photo Plate 5 (Appendix B) shows a typical burned yellow rabbitbrush/bluebunch wheatgrass community.

5.2 Vegetation Transects

HDR (2014, 2015) established four transects within the current Permit Area in the Wyoming big sagebrush/bluebunch wheatgrass plant community. Three additional transects were established during the 2017 surveys in areas that were not previously surveyed within the revised Permit Area: one within the bluebunch wheatgrass/cheatgrass/annual community; one within the crested wheatgrass seeding community; and one within the Wyoming big sagebrush/crested wheatgrass community (Figure 4). The results of the surveys conducted by HDR are included in Attachment A. The results of the 2017 survey are discussed in Sections 5.2.1 to 5.2.3.

5.2.1 Transect 1

One ten-foot wide by ten-foot long transect was established on May 21, 2017, at North (N) 43.73541, West (W) 117.31324, in Section 23, T21S, R44E, adjacent to Daubenmire 5 (Figure 4). Transect 1 is located on a south-facing aspect with slopes ranging from four to 15 percent, within the bluebunch wheatgrass/cheatgrass/annual community. Approximately 70 percent of the slope is vegetated, 15 percent is bare ground, ten percent is litter, and five percent is rock. Information for Transect 1 is presented in Table 1. Photo Plate 6 (Appendix B) shows the characteristic vegetative cover surrounding Transect 1.

Table 1: Transect 1 - Bluebunch Wheatgrass/Cheatgrass/Annual Community

Common Name	Scientific Name	Quantity
Cheatgrass	*Bromus tectorum*	dominant
Bastard toadflax	*Commandra umbellata*	33
Prickly phlox	*Phlox hoodii*	13
Bluebunch wheatgrass	*Pseudoroegneria spicata*	6
Slimflower scurfpea	*Psoralidium tenuiflorum*	10

5.2.2 Transect 2

One ten-foot wide by ten-foot long transect was established on May 21, 2017, at N 43.70473, W 117.36408, in Section 32, T21S, R44E, adjacent to Daubenmire 6 (Figure 4). Transect 2 is located on a north-facing aspect with a ten percent slope, within the crested wheatgrass seeding community. Approximately 49 percent of the slope is vegetated, 40 percent is bare ground, ten percent is litter, and one percent is rock. Information for Transect 2 is presented in Table 2. Photo Plate 7 (Appendix B) shows the characteristic vegetative cover surrounding Transect 2.

Table 2: Transect 2 - Crested Wheatgrass Seeding Community

Common Name	Scientific Name	Quantity
Crested wheatgrass	*Agropyron cristatum*	33
Cheatgrass	*Bromus tectorum*	dominant
Curveseed butterwort	*Ceratocephala testiculata*	dominant
Gooseberryleaf globemallow	*Sphaeralcea grossulariifolia*	2
Small fescue	*Vulpia microstachys*	100

5.2.3 Transect 3

One ten-foot wide by ten-foot long transect was established on May 21, 2017, at N 43.67957, W 117.36263, in Section 5, T22S, R44E, adjacent to Daubenmire 7 (Figure 4). Transect 3 is located on a northwest-facing aspect with slopes ranging from five to six percent, within the Wyoming big sagebrush/crested wheatgrass community. Approximately 75 percent of the slope is vegetated, 15 percent is rock, five percent is litter, and five percent is bare ground. Information for Transect 3 is presented in Table 3. Photo Plate 8 (Appendix B) shows the characteristic vegetative cover surrounding Transect 3.

Table 3: Transect 3 – Wyoming Big Sagebrush/Crested Wheatgrass Community

Common Name	Scientific Name	Quantity
Crested wheatgrass	*Agropyron cristatum*	47
Wyoming big sagebrush	*Artemisia tridentate* ssp. *wyomingensis*	1
Cheatgrass	*Bromus tectorum*	dominant
Sandberg bluegrass	*Poa secunda*	32

5.3 Daubenmire Sampling Results

HDR (2014, 2015) established seven Daubenmire transects within the current Permit Area: six within the Wyoming big sagebrush/bluebunch wheatgrass community, and one within the crested wheatgrass seeding community. Seven additional Daubenmire transects were established during the 2017 survey in areas that were not previously surveyed within the revised Permit Area: two within the bluebunch wheatgrass/cheatgrass/annual community; one within the crested wheatgrass seeding community; two within the Wyoming big sagebrush/bluebunch wheatgrass community; one within the burned yellow rabbitbrush/bluebunch wheatgrass community; and one within the Wyoming big sagebrush/crested wheatgrass community (Figure 4). The results of the surveys conducted by HDR are included in Attachment A. The results of the 2017 survey are discussed in Sections 5.3.1 to 5.3.7.

5.3.1 Daubenmire 1 – Bluebunch Wheatgrass/Cheatgrass/Annual Community

A Daubenmire vegetation survey was performed on May 20, 2017, at N 43.87277, W 117.27930, in Section 36, T19S, R44E (Figure 4). The sampling plot is located on BLM land within the Access Road Area within the bluebunch wheatgrass/cheatgrass/annual vegetation community. Information for Daubenmire 1 is presented in Table 4. Cheatgrass had the highest percentage of canopy cover, species composition, and frequency. Sandberg bluegrass also occurred at a high frequency within the 50 surveyed quadrats. Photo Plate 9 (Appendix B) shows Daubenmire 1. The completed survey form is included in Appendix E.

Table 4: Daubenmire 1 - Bluebunch Wheatgrass/Cheatgrass/Annual Community

Plant Species	Percent Canopy Cover	Species Composition	Frequency
BRTE – *Bromus tectorum*	39	53	92
POSE – *Poa secunda*	33	45	90
SIAL -- *Sisymbrium altissimum*	1	1.4	14

5.3.2 Daubenmire 2 – Wyoming Big Sagebrush/Bluebunch Wheatgrass Community

A Daubenmire vegetation survey was performed on May 20, 2017, at N 43.86094, W 117.27670, in Section 1, T20S, R44E (Figure 4). The sampling plot is located on BLM land within the Access Road Area within the Wyoming big sagebrush/bluebunch wheatgrass vegetation community. Information for Daubenmire 2 is presented in Table 5. Cheatgrass had the highest percentage of canopy cover, species composition, and frequency. Wyoming big sagebrush and Sandberg bluegrass also occurred at a high frequency within the 50 surveyed quadrats. Photo Plate 10 (Appendix B) shows Daubenmire 2. The completed survey form is included in Appendix E.

Table 5: Daubenmire 2 – Wyoming Big Sagebrush/Bluebunch Wheatgrass Community

Plant Species	Percent Canopy Cover	Species Composition	Frequency
BRTE – *Bromus tectorum*	30	47	98
POSE – *Poa secunda*	21	33	76
ARTRW – *Artemisia tridentata* ssp. *wyomingensis*	8	13	34

5.3.3 Daubenmire 3 – Burned Yellow Rabbitbrush/Bluebunch Wheatgrass Community

A Daubenmire vegetation survey was performed on May 20, 2017, at N 43.79958, W 117.31617, in Section 1, T20S, R44E (Figure 4). The sampling plot is located on BLM land within the Access Road Area within the burned yellow rabbitbrush/bluebunch wheatgrass vegetation community. Information for Daubenmire 3 is presented in Table 6. Daubenmire survey results at this location show that Sandberg bluegrass had the highest percentage of canopy cover, species composition, and frequency. Bluebunch wheatgrass and cheatgrass also occurred at a high frequency within the 50 surveyed quadrats. Photo Plate 11 (Appendix B) shows Daubenmire 3. The completed survey form is included in Appendix E.

Table 6: Daubenmire 3 – Burned Yellow Rabbitbrush/Bluebunch Wheatgrass Community

Plant Species	Percent Canopy Cover	Species Composition	Frequency
POSE – *Poa secunda*	22	60	100
PSSPS – *Pseudoroegneria spicata*	7	20	46
BRTE – *Bromus tectorum*	4	11	84

5.3.4 Daubenmire 4 – Wyoming Big Sagebrush/Bluebunch Wheatgrass Community

A Daubenmire vegetation survey was performed on May 20, 2017, at N 43.75393, W 117.31122, in Section 11, T21S, R44E (Figure 4). The sampling plot is located on BLM land within the Access Road Area within the Wyoming big sagebrush/bluebunch wheatgrass vegetation community. Information for Daubenmire 4 is presented in Table 7. Daubenmire survey results at this location show that Sandberg bluegrass had the highest percentage of canopy cover, species composition, and frequency. Wyoming big sagebrush and cheatgrass also occurred at a high frequency within the 50 surveyed quadrats. Photo Plate 12 (Appendix B) shows Daubenmire 4. The completed survey form is included in Appendix E.

Table 7: Daubenmire 4 – Wyoming Big Sagebrush/Bluebunch Wheatgrass Community

Plant Species	Percent Canopy Cover	Species Composition	Frequency
POSE – *Poa secunda*	14	37	90
ARTRW – *Artemisia tridentata* ssp. *wyomingensis*	10	28	30
BRTE – *Bromus tectorum*	7	19	80

5.3.5 Daubenmire 5 – Bluebunch Wheatgrass/Cheatgrass/Annual Community

A Daubenmire vegetation survey was performed on May 21, 2017, at N 43.73541, W 117.31324, in Section 23, T21S, R44E (Figure 4). The sampling plot is located on BLM land within the Access Road Area within the bluebunch wheatgrass/cheatgrass/annual vegetation community. Information for Daubenmire 5 is presented in Table 8. Daubenmire survey results at this location show that cheatgrass had the highest percentage of canopy cover, species composition, and frequency. Bluebunch wheatgrass also occurred at a high frequency within the 50 surveyed quadrats. Photo Plate 13 (Appendix B) shows Daubenmire 5. The completed survey form is included in Appendix E.

Table 8: Daubenmire 5 – Bluebunch Wheatgrass/Cheatgrass/Annual Community

Plant Species	Percent Canopy Cover	Species Composition	Frequency
BRTE – *Bromus tectorum*	39	72	100
PSSPS – *Pseudoroegneria spicata*	11	20	48

5.3.6 Daubenmire 6 – Crested Wheatgrass Seeding Community

A Daubenmire vegetation survey was performed on May 21, 2017, at N 43.70473, W 117.36408, in Section 32, T21S, R44E (Figure 4). The sampling plot is located on BLM land in the Access Road Area within the crested wheatgrass seeding vegetation community. Information for Daubenmire 6 is presented in Table 9. Daubenmire survey results at this location show that crested wheatgrass had the highest percentage of canopy cover and species composition. Cheatgrass and curveseed butterwort (*Ceratocephala testiculata*) also occurred at a high frequency within the 50 surveyed quadrats. Photo Plate 14 (Appendix B) shows Daubenmire 6. The completed survey form is included in Appendix E.

Table 9: Daubenmire 6 – Crested Wheatgrass Seeding Community

Plant Species	Percent Canopy Cover	Species Composition	Frequency
PSSPS – *Pseudoroegneria spicata*	16	49	82
BRTE – *Bromus tectorum*	11	33	98
RATE – *Ceratocephala testiculata*	4	11	100

5.3.7 Daubenmire 7 – Wyoming Big Sagebrush/Crested Wheatgrass Community

A Daubenmire vegetation survey was performed on May 21, 2017, at N 43.67957, W 117.36263, in Section 5, T22S, R44E (Figure 4). The sampling plot is located on BLM land within the Mine and Process Area within the Wyoming big sagebrush/crested wheatgrass vegetation community. Information for Daubenmire 7 is presented in Table 10. Daubenmire survey results at this location show that cheatgrass had the highest percentage of canopy cover, species composition, and frequency. Bluebunch wheatgrass and Sandberg bluegrass also occurred at a high frequency within the 50 surveyed quadrats. Photo Plate 15 (Appendix B) shows Daubenmire 7. The completed survey form is included in Appendix E.

Table 10: Daubenmire 7 – Wyoming Big Sagebrush/Crested Wheatgrass Community

Plant Species	Percent Canopy Cover	Species Composition	Frequency
BRTE – *Bromus tectorum*	22	53	98
PSSPS – *Pseudoroegneria spicata*	9	22	56
POSE – *Poa secunda*	4	9	46

5.4 Special Status Plant Species

5.4.1 Threatened and Endangered Species

5.4.1.1 Federal

An Information from Planning and Conservation (IPaC) consultation with the USFWS (Consultation Code: 01EOFW00-2018-SLI-0114) reported that no federally threatened or endangered plant species are known to occur within the 2017 Survey Area (Appendix F). No federally threatened or endangered species were observed during the 2017 vegetation survey of the 2017 Survey Area, or during the surveys by HDR of the 2014/2015 Survey Area (HDR 2014, 2015).

5.4.1.2 State

A list of rare, threatened, and endangered plant records was obtained from ORBIC in April 2017 (Appendix G). Two plant species were reported to occur within two miles of the Permit Area (Figure 5). Cronquist's stickseed (*Hackelia cronquistii*) is a State Threatened species and a federal Species of Concern. Cronquist's stickseed inhabits shrub-steppe communities typically dominated by sagebrush. It occurs on sandy north-facing hillsides with slight to extreme slopes, sometimes on moist slopes in ravines, at elevations ranging from 2,000 to 3,640 feet above mean sea level (amsl) (ODA 2017a).

Mulford's milk-vetch (*Astragalus mulfordiae*) is a State Endangered species and a federal Species of Concern. Mulford's milk-vetch inhabits sandy substrates including old river deposits, sandy areas near rivers, sandy bluffs, and dune-like talus in foothills at approximately 2,200 to 2,790 feet amsl. It is found mainly in shrub-steppe and desert shrub communities (ODA 2017b).

Both species have reported occurrences within the Access Road Area; however, neither species was observed within the 2017 Survey Area during the 2017 vegetation survey. No State-listed species were observed during the surveys by HDR of the 2014/2015 Survey Area (HDR 2014, 2015).

5.4.2 BLM Sensitive Species

The *Final OR/WA State Director's Special Status Species List, July 13, 2015,* which lists BLM Sensitive plant species suspected or documented to occur within the Vale District is included in Appendix A. No Sensitive species were observed during the 2017 vegetation survey of the 2017 Survey Area, or during the surveys by HDR of the 2014/2015 Survey Area (HDR 2014, 2015).

Figure 5: ORBIC Sensitive Species Data (Confidential – submitted separately)

5.5 Noxious Weed Species

A list of noxious weeds for Malheur County, Oregon (Appendix B), was obtained from the Malheur County Weed Advisory Board. Malheur County has prioritized control and/or eradication of noxious weeds by A, B, and C classes, with Class A having the highest priority. The following noxious weeds were observed during the 2017 vegetation survey:

- One Class B species, nodding thistle (*Carduus nutans*), along the Access Road Area within the northern portion of the 2017 Survey Area in the Daubenmire 1 transect. All Class B weeds are required to be controlled within 50 feet of all property lines, easements, and rights-of-way.

- One Class C species within the Study Area: cheatgrass. These species can be treated at the landowner's discretion. Cheatgrass is the most dominant grass species throughout the 2017 Survey Area.

During the 2013 vegetation survey, HDR found the following noxious weed species (HDR 2014):

- One small, isolated population of a Class A weed species, Austrian peaweed (*Sphaerophysa salusula*), adjacent to the Access Road Area. This species is subject to mandatory control/eradication where found.

- One Class B species, Canada thistle (*Cirsium arvense*), near the northern boundary of the Mine and Process Area. All Class B weeds are required to be controlled within 50 feet of all property lines, easements, and rights-of-way.

- Three Class C species: cheatgrass; medusahead (*Taeniatherum caput-medusae*); and field bindweed (*Convoculus arvensis*). These species can be treated at the landowner's discretion. Cheatgrass and medusahead are the most dominant grass species.

5.6 Description of Competing Land Uses

The primary adjacent land use to the Project has been and continues to be cattle grazing. Evidence of heavy grazing was present throughout much of the 2017 Study Area during the 2017 vegetation field surveys. The mine site and processing facilities will be fenced, and grazing will be excluded. It is likely that grazing would continue to occur on land adjacent to the Permit Area.

5.7 Revegetation and Reclamation Considerations and Opportunities

Disturbed sites will be reclaimed and revegetated during and after mining activities. Qualified personnel will analyze the pre-disturbance soil characteristics and determine the amount of soil that should be stockpiled for revegetation and reclamation. Disturbed areas will be seeded with a native seed mixture that is approved by the BLM and other state agencies, as appropriate. A preliminary reclamation seed mixture is presented in Table 11. The reclamation goal will be to establish a self-sustaining ecosystem, comparable to undamaged ecosystems in the area of the mine. Vegetation test plots and chemical/physical soil and subsoil analysis may be required to ensure establishment feasibility.

Table 11: Preliminary Reclamation Seed Mixture

Common Name	Scientific Name	Pure Live Seed (PLS) per Acre
Wyoming big sagebrush	*Artemisia tridentata* ssp. *wyomingensis*	0.10
Bluebunch wheatgrass	*Pseudoroegneria spicata*	8.00
Bottlebrush squirreltail	*Elymus elymoides*	2.00
Total Application Rate (lbs/acre)		10.10

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Rich DeLong – Technical Review
Ellen Farley – Editorial Review

APPENDIX A

BLM STATE OF OREGON SENSITIVE PLANT SPECIES LIST

State Sensitive Species List (Vale District)

Scientific Name	Common Name	BLM Occurrence Status (Vale District)
ANTHELIA JULACEA	LIVERWORT	Suspected
BARBILOPHOZIA LYCOPODIOIDES	LIVERWORT	Suspected
JUNGERMANNIA POLARIS	LIVERWORT	Suspected
LOPHOZIA GILLMANII	LIVERWORT	Suspected
PELTOLEPIS QUADRATA	LIVERWORT	Suspected
PREISSIA QUADRATA	LIVERWORT	Suspected
PTILIDIUM PULCHERRIMUM	LIVERWORT	Suspected
SCHISTIDIUM CINCLIDODONTEUM	MOSS	Suspected
TEXOSPORIUM SANCTI-JACOBI	LICHEN	Suspected
ABRONIA TURBINATA	TRANS MONTANE ABRONIA	Documented
ACHNATHERUM SPECIOSUM	DESERT NEEDLEGRASS	Suspected
ACHNATHERUM WALLOWAENSIS	WALLOWA RICEGRASS	Suspected
AGASTACHE CUSICKII	CUSICK'S GIANT-HYSSOP	Documented
ALLENROLFEA OCCIDENTALIS	IODINE BUSH	Documented
ALLIUM GEYERI VAR. GEYERI	GEYER'S ONION	Suspected
AMSINCKIA CARINATA	MALHEUR VALLEY FIDDLENECK	Documented
ARGEMONE MUNITA	PRICKLY-POPPY	Documented
ARTEMISIA ARBUSCULA SSP. LONGICAULIS	LAHONTAN SAGEBRUSH	Documented
ARTEMISIA PAPPOSA	OWYHEE SAGEBRUSH	Documented
ASPLENIUM TRICHOMANES-RAMOSUM	GREEN SPLEENWORT	Suspected
ASTRAGALUS CALYCOSUS	KING'S RATTLEWEED	Documented
ASTRAGALUS CUSICKII VAR. STERILIS	STERILE MILK-VETCH	Documented
ASTRAGALUS GEYERI VAR. GEYERI	GEYER'S MILK-VETCH	Documented
ASTRAGALUS MULFORDIAE	MULFORD'S MILK-VETCH	Documented
ASTRAGALUS PLATYTROPIS	BROAD-KEELED MILK-VETCH	Documented
BOTRYCHIUM ASCENDENS	UPWARD-LOBED MOONWORT	Suspected
BOTRYCHIUM CAMPESTRE	PRAIRIE MOONWORT	Suspected
BOTRYCHIUM CRENULATUM	CRENULATE MOONWORT	Suspected
BOTRYCHIUM HESPERIUM	WESTERN MOONWORT	Suspected
BOTRYCHIUM LINEARE	SLENDER MOONWORT	Suspected
BOTRYCHIUM LUNARIA	MOONWORT	Suspected
BOTRYCHIUM MONTANUM	MOUNTAIN GRAPE-FERN	Suspected
BOTRYCHIUM PARADOXUM	TWIN-SPIKED MOONWART	Suspected
BOTRYCHIUM PEDUNCULOSUM	STALKED MOONWORT	Suspected
BUPLEURUM AMERICANUM	BUPLEURUM	Documented
CALOCHORTUS MACROCARPUS VAR. MACULOSUS	GREEN-BAND MARIPOSA-LILY	Documented
CALOCHORTUS NITIDUS	BROAD-FRUIT MARIPOSA-LILY	Suspected
CAMISSONIA PYGMAEA	DWARF EVENING-PRIMROSE	Suspected
CAREX ATROSQUAMA	BLACKENED SEDGE	Suspected
CAREX CAPILLARIS	HAIRLIKE SEDGE	Suspected
CAREX CORDILLERANA	CORDILLERAN SEDGE	Documented
CAREX GYNOCRATES	YELLOW BOG SEDGE	Suspected
CAREX IDAHOA	IDAHO SEDGE	Suspected
CAREX LASIOCARPA VAR. AMERICANA	SLENDER SEDGE	Suspected
CAREX MEDIA	INTERMEDIATE SEDGE	Suspected
CAREX MICROPODA	PYRENAEAN SEDGE	Suspected
CAREX NARDINA	SPIKENARD SEDGE	Suspected
CAREX PELOCARPA	NEW SEDGE	Suspected
CAREX RETRORSA	RETRORSE SEDGE	Suspected
CAREX SUBNIGRICANS	DARK ALPINE SEDGE	Suspected
CAREX VERNACULA	NATIVE SEDGE	Suspected

State Sensitive Species List (Vale District)

Scientific Name	Common Name	BLM Occurrence Status (Vale District)
CASTILLEJA FLAVA VAR. RUSTICA	RURAL PAINTBRUSH	Documented
CASTILLEJA FRATERNA	FRATERNAL PAINTBRUSH	Suspected
CASTILLEJA RUBIDA	PURPLE ALPINE PAINTBRUSH	Suspected
CAULANTHUS CRASSICAULIS VAR. GLABER	SMOOTH WILD CABBAGE	Documented
CAULANTHUS MAJOR VAR. NEVADENSIS	SLENDER WILD CABBAGE	Documented
CHAENACTIS XANTIANA	DESERT CHAENACTIS	Documented
CHAETADELPHA WHEELERI	WHEELER'S SKELETON-WEED	Documented
CHEILANTHES FEEI	FEE'S LIP-FERN	Suspected
COLLOMIA RENACTA	BARREN VALLEY COLLOMIA	Documented
CRYPTOGRAMMA STELLERI	STELLER'S ROCKBRAKE	Suspected
CYMOPTERUS ACAULIS VAR. GREELEYORUM	GREELEY'S CYMOPTERUS	Documented
CYMOPTERUS IBAPENSIS	IBAPAH WAVEWING	Documented
CYPERUS LUPULINUS SSP. LUPULINUS	A CYPERUS	Suspected
CYPRIPEDIUM FASCICULATUM	CLUSTERED LADY'S-SLIPPER	Suspected
DELPHINIUM BICOLOR	FLATHEAD LARKSPUR	Documented
DODECATHEON PULCHELLUM VAR. SHOSHONENSE	DARKTHROAT SHOOTINGSTAR	Documented
ELATINE BRACHYSPERMA	SHORT SEEDED WATERWORT	Documented
ELEOCHARIS BOLANDERI	BOLANDER'S SPIKERUSH	Documented
ERIGERON DISPARIPILUS	WHITE CUSHION ERIGERON	Suspected
ERIGERON ENGELMANNII VAR. DAVISII	ENGELMANN'S DAISY	Suspected
ERIGERON LATUS	BROAD FLEABANE	Documented
ERIOGONUM CHRYSOPS	GOLDEN BUCKWHEAT	Documented
ERIOGONUM HOOKERI	HOOKER'S WILD BUCKWHEAT	Documented
ERIOGONUM PROCIDUUM	PROSTRATE BUCKWHEAT	Documented
ERIOGONUM SALICORNIOIDES	PLAYA BUCKWHEAT	Documented
GEUM ROSSII VAR. TURBINATUM	SLENDER-STEMMED AVENS	Suspected
HACKELIA CRONQUISTII	CRONQUIST'S STICKSEED	Documented
HACKELIA OPHIOBIA	THREE FORKS STICKSEED	Documented
HELIOTROPIUM CURASSAVICUM	SALT HELIOTROPE	Documented
HYMENOXYS LEMMONII	COOPER'S GOLDFLOWER	Documented
IVESIA RHYPARA VAR. RHYPARA	GRIMY IVESIA	Documented
IVESIA SHOCKLEYI	SHOCKLEY'S IVESIA	Documented
JUNCUS TRIGLUMIS VAR. ALBESCENS	THREE-FLOWERED RUSH	Suspected
KOBRESIA MYOSUROIDES	BELLARD'S KOBRESIA	Suspected
KOBRESIA SIMPLICIUSCULA	SIMPLE KOBRESIA	Suspected
LEPIDIUM DAVISII	DAVIS' PEPPERGRASS	Documented
LIPOCARPHA ARISTULATA	ARISTULATE LIPOCARPHA	Suspected
LISTERA BOREALIS	NORTHERN TWAYBLADE	Suspected
LOMATIUM ERYTHROCARPUM	RED-FRUITED LOMATIUM	Suspected
LOMATIUM FOENICULACEUM SSP. FIMBRIATUM	FRINGED DESERT-PARSLEY	Documented
LOMATIUM ROSEANUM	ROSE'S LOMATIUM	Documented
LUPINUS CUSICKII VAR. CUSICKII	CUSICK'S LUPINE	Documented
LUPINUS NEVADENSIS	NEVADA LUPINE	Documented
LYCOPODIUM COMPLANATUM	GROUND CEDAR	Suspected
MALACOTHRIX SONCHOIDES	LYRATE MALACOTHRIX	Documented
MENTZELIA CONGESTA	UNITED BLAZINGSTAR	Documented
MENTZELIA MOLLIS	SMOOTH MENTZELIA	Documented
MIMULUS EVANESCENS	DISAPPEARING MONKEYFLOWER	Documented
MIMULUS HYMENOPHYLLUS	MEMBRANE-LEAVED MONKEYFLOWER	Suspected
MIRABILIS MACFARLANEI	MACFARLANE'S FOUR O'CLOCK	Suspected

State Sensitive Species List (Vale District)

Scientific Name	Common Name	BLM Occurrence Status (Vale District)
MUHLENBERGIA MINUTISSIMA	ANNUAL DROPSEED	Documented
OPHIOGLOSSUM PUSILLUM	ADDER'S-TONGUE	Suspected
OXYTROPIS SERICEA VAR. SERICEA	WHITE LOCOWEED	Documented
PELLAEA BRIDGESII	BRIDGES' CLIFF-BRAKE	Suspected
PHACELIA INUNDATA	PLAYA PHACELIA	Documented
PHACELIA LUTEA VAR. MACKENZIEORUM	MACKENZIE'S PHACELIA	Documented
PHACELIA MINUTISSIMA	DWARF PHACELIA	Suspected
PHLOX HENDERSONII	HENDERSON'S PHLOX	Suspected
PHLOX MULTIFLORA	MANY-FLOWERED PHLOX	Suspected
PHYSARIA CHAMBERSII	CHAMBERS' TWINPOD	Documented
PINUS ALBICAULIS	WHITEBARK PINE	Documented
PLATANTHERA OBTUSATA	SMALL NORTHERN BOG-ORCHID	Suspected
PLEUROPOGON OREGONUS	OREGON SEMAPHOREGRASS	Suspected
POGOGYNE FLORIBUNDA	PROFUSE-FLOWEREED MESA MINT	Documented
POTAMOGETON DIVERSIFOLIUS	RAFINESQUE'S PONDWEED	Documented
PRENANTHELLA EXIGUA	DESERT PRENANTHELLA	Documented
PYRROCOMA RADIATA	SNAKE RIVER GOLDENWEED	Documented
PYRROCOMA SCABERULA	ROUGH PYRROCOMA	Documented
RAFINESQUIA CALIFORNICA	CALIFORNIA CHICORY	Documented
RORIPPA COLUMBIAE	COLUMBIA CRESS	Suspected
RUBUS BARTONIANUS	BARTONBERRY	Documented
SALIX FARRIAE	FARR'S WILLOW	Suspected
SALIX WOLFII	WOLF'S WILLOW	Suspected
SAXIFRAGA ADSCENDENS SSP. OREGONENSIS	WEDGE-LEAF SAXIFRAGE	Suspected
SENECIO ERTTERAE	ERTTER'S SENECIO	Documented
SILENE SPALDINGII	SPALDING'S CATCHFLY	Documented
STANLEYA CONFERTIFLORA	BIENNIAL STANLEYA	Documented
SUKSDORFIA VIOLACEA	VIOLET SUKSDORFIA	Suspected
SYMPHORICARPOS LONGIFLORUS	LONG-FLOWERED SNOWBERRY	Documented
THALICTRUM ALPINUM	ALPINE MEADOWRUE	Suspected
THELYPODIUM EUCOSMUM	ARROW-LEAF THELYPODY	Suspected
THELYPODIUM HOWELLII SSP. SPECTABILIS	HOWELL'S SPECTACULAR THELYPODY	Suspected
TOWNSENDIA MONTANA	MOUNTAIN TOWNSENDIA	Suspected
TOWNSENDIA PARRYI	PARRY'S TOWNSENDIA	Suspected
TRIFOLIUM DOUGLASII	DOUGLAS' CLOVER	Suspected
TRIFOLIUM LEIBERGII	LEIBERG'S CLOVER	Documented
TRIFOLIUM OWYHEENSE	OWYHEE CLOVER	Documented
TROLLIUS LAXUS SSP. ALBIFLORUS	AMERICAN GLOBEFLOWER	Suspected
UTRICULARIA MINOR	LESSER BLADDERWORT	Suspected

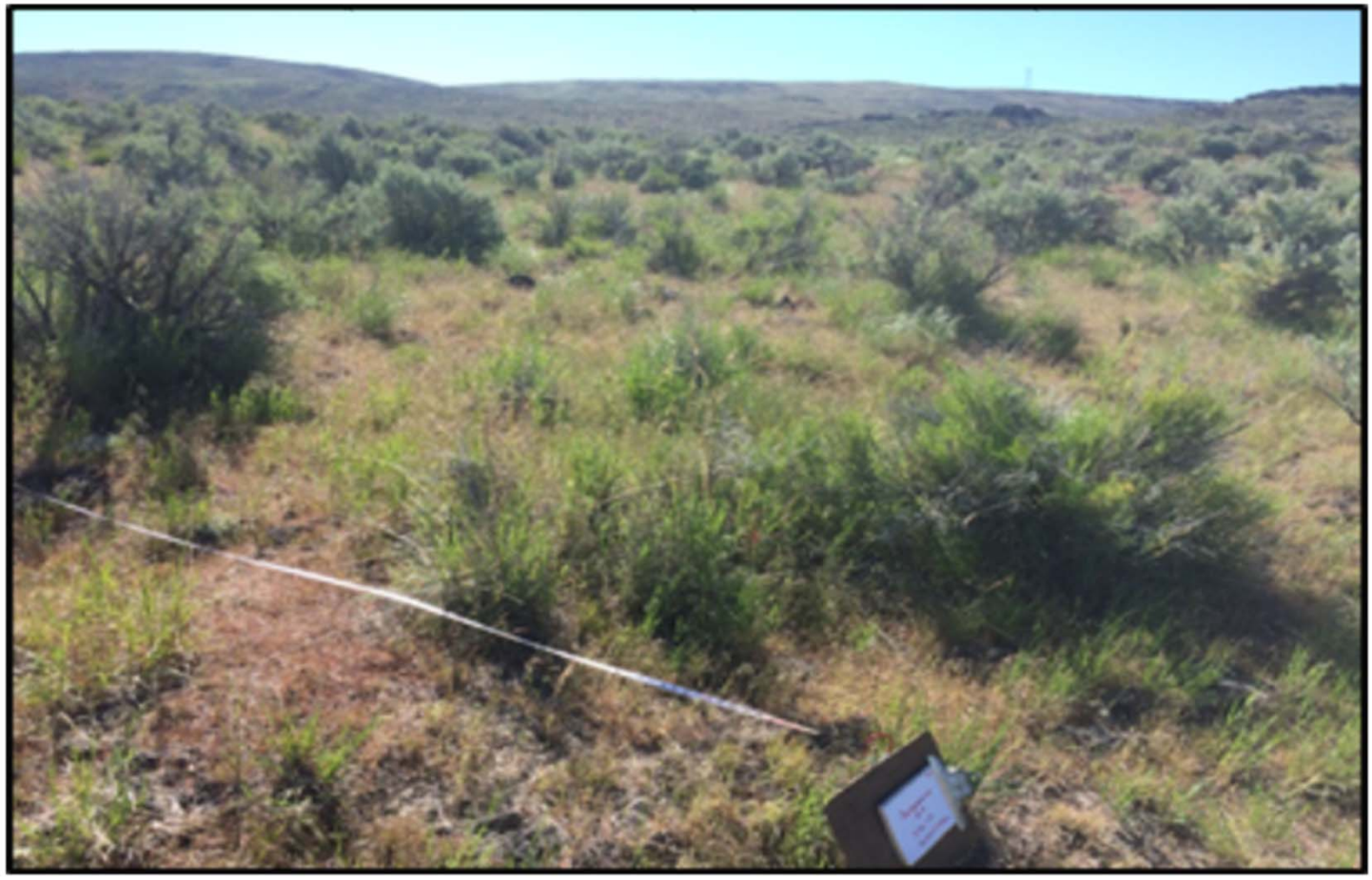
APPENDIX B

PHOTOGRAPHIC LOG

Grassy Mountain Mine Project - 2017 Baseline Vegetation Survey Report

Photo Plate 1

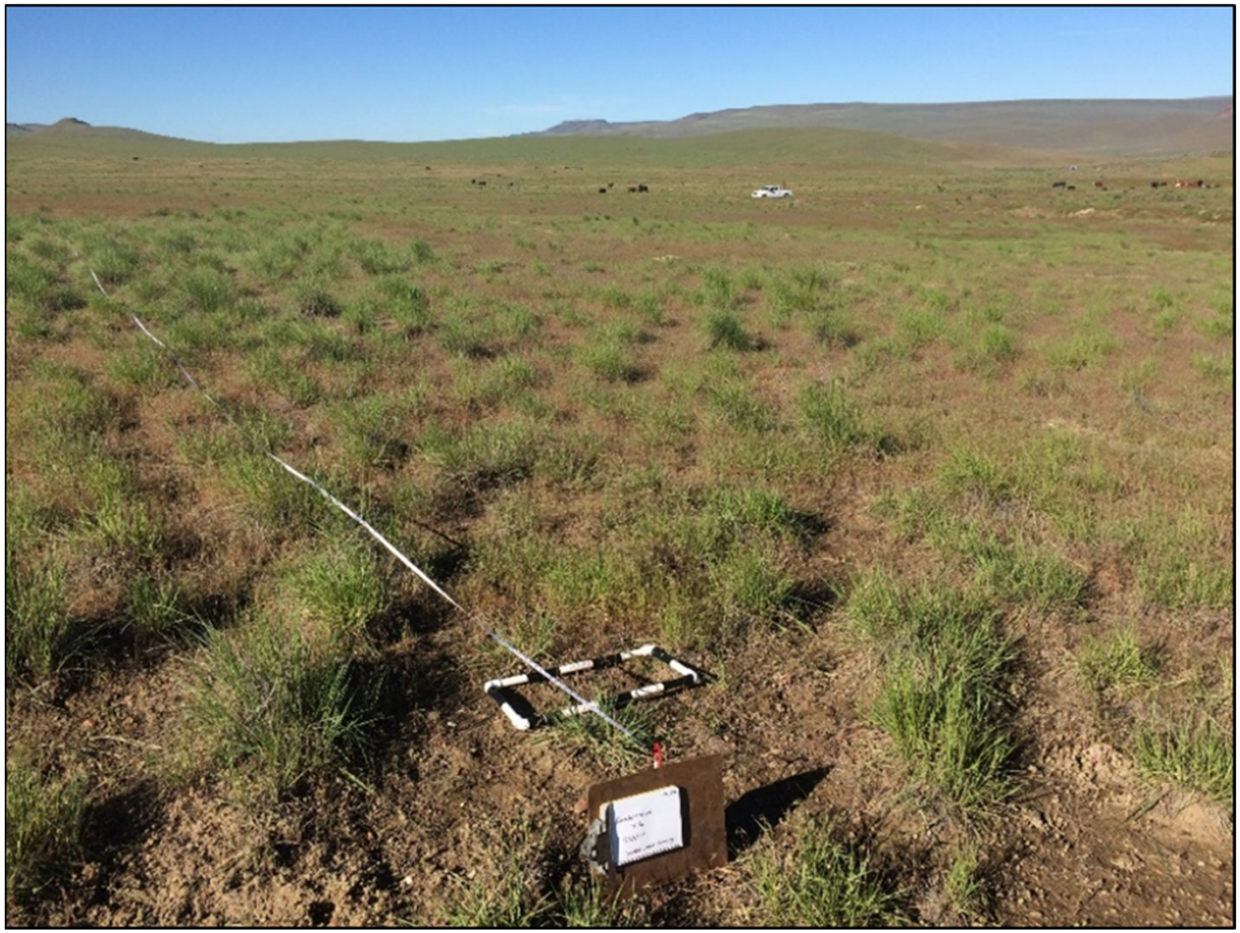
Typical Mountain Big Sagebrush/Crested Wheatgrass Community



Grassy Mountain Mine Project - 2017 Baseline Vegetation Survey Report

Photo Plate 2

Typical Crested Wheatgrass Seeding Community



Grassy Mountain Mine Project - 2017 Baseline Vegetation Survey Report

Photo Plate 3

Typical Bluebunch Wheatgrass/Cheatgrass/Annual Community

Grassy Mountain Mine Project - 2017 Baseline Vegetation Survey Report

Photo Plate 4

Typical Mountain Big Sagebrush/Bluebunch Wheatgrass Community

Grassy Mountain Mine Project - 2017 Baseline Vegetation Survey Report

Photo Plate 5

Typical Yellow Rabbitbrush/Bluebunch Wheatgrass Community

Grassy Mountain Mine Project - 2017 Baseline Vegetation Survey Report

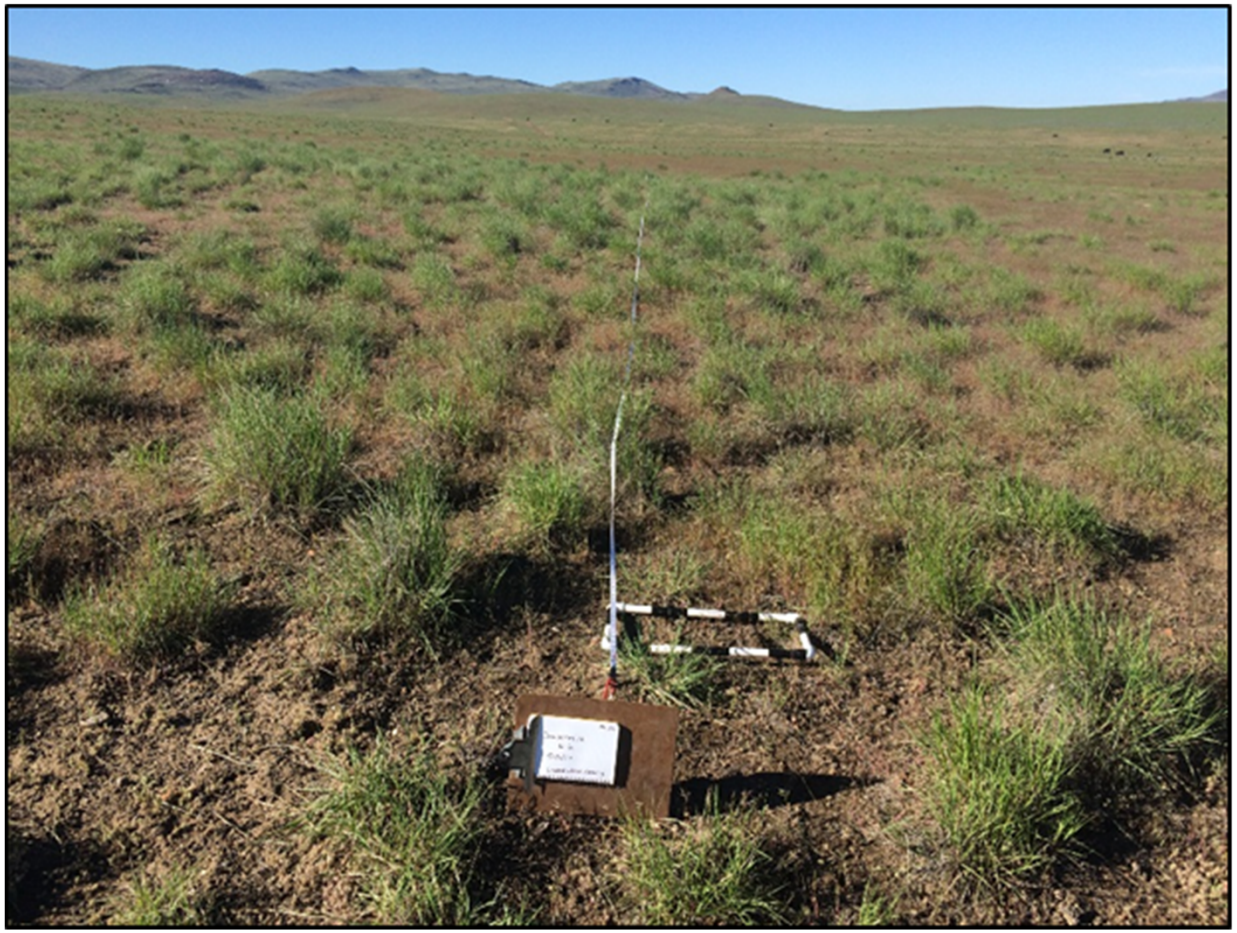
Photo Plate 6

Transect 1

Grassy Mountain Mine Project - 2017 Baseline Vegetation Survey Report

Photo Plate 7

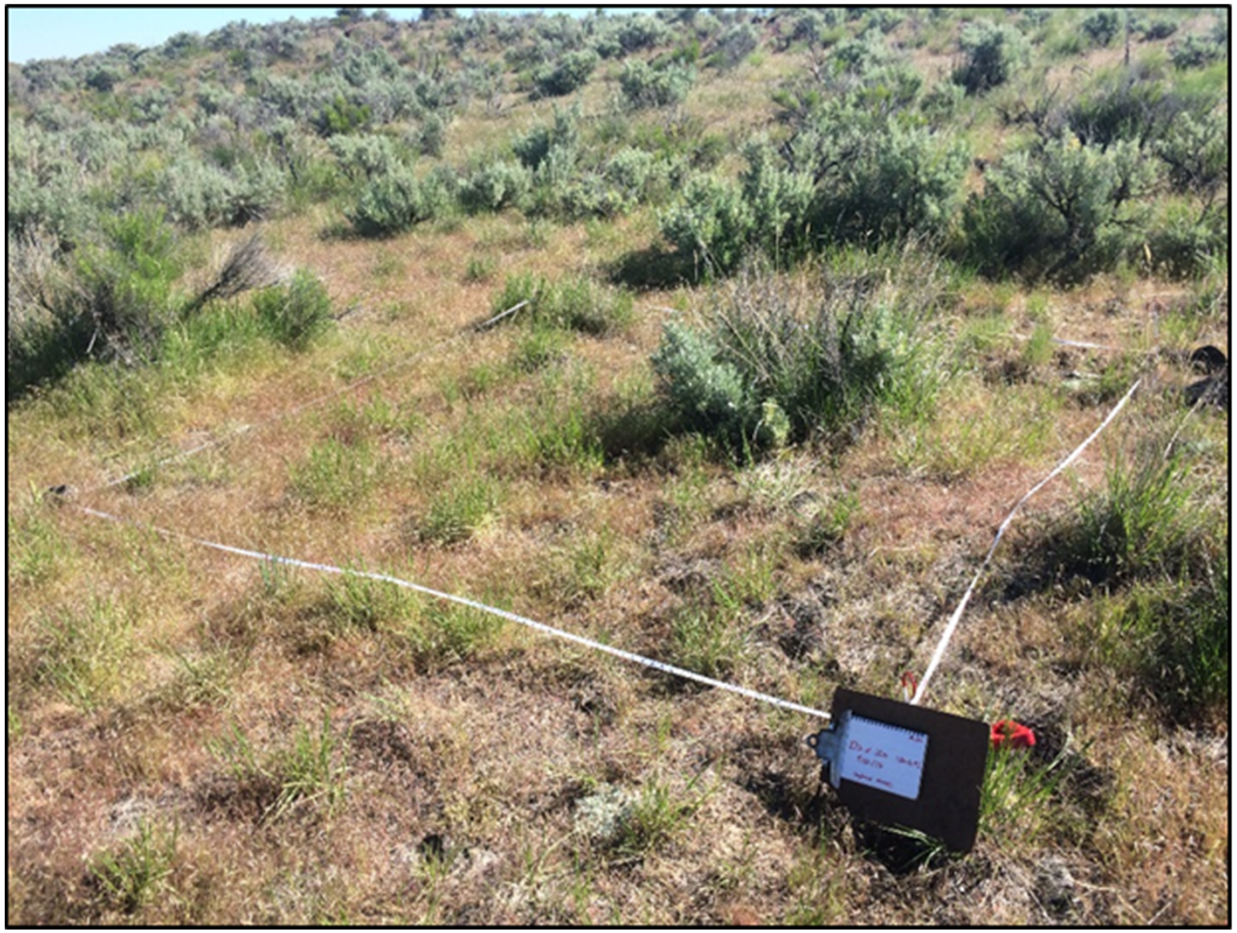
Transect 2



Grassy Mountain Mine Project - 2017 Baseline Vegetation Survey Report

Photo Plate 8

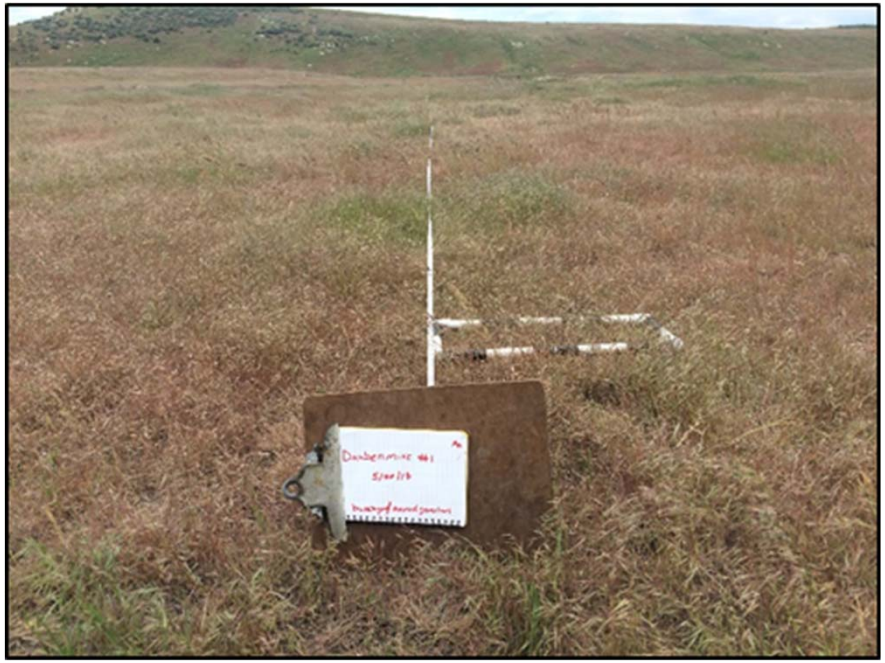
Transect 3

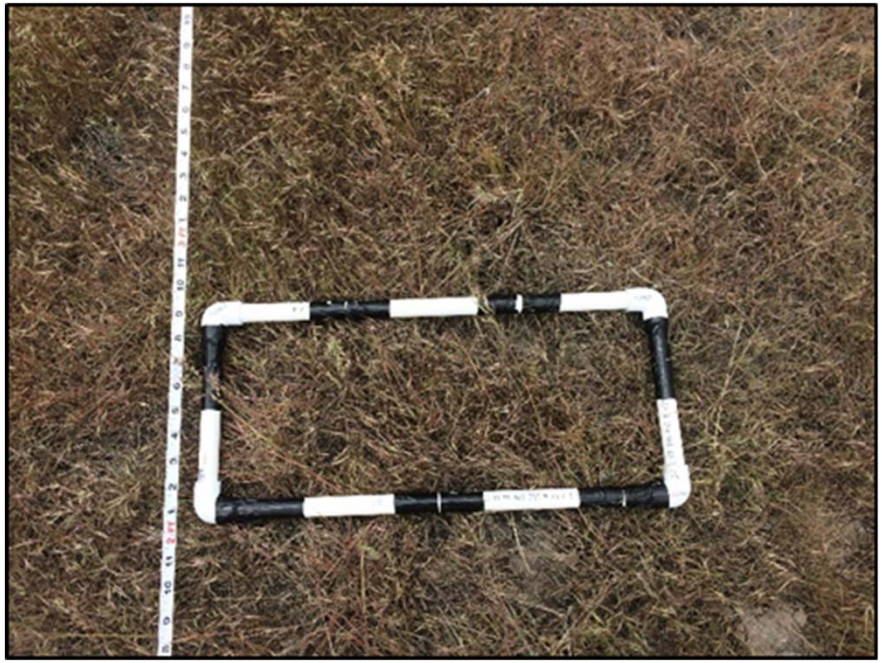


Grassy Mountain Mine Project - 2017 Baseline Vegetation Survey Report

Photo Plate 9

Daubenmire 1

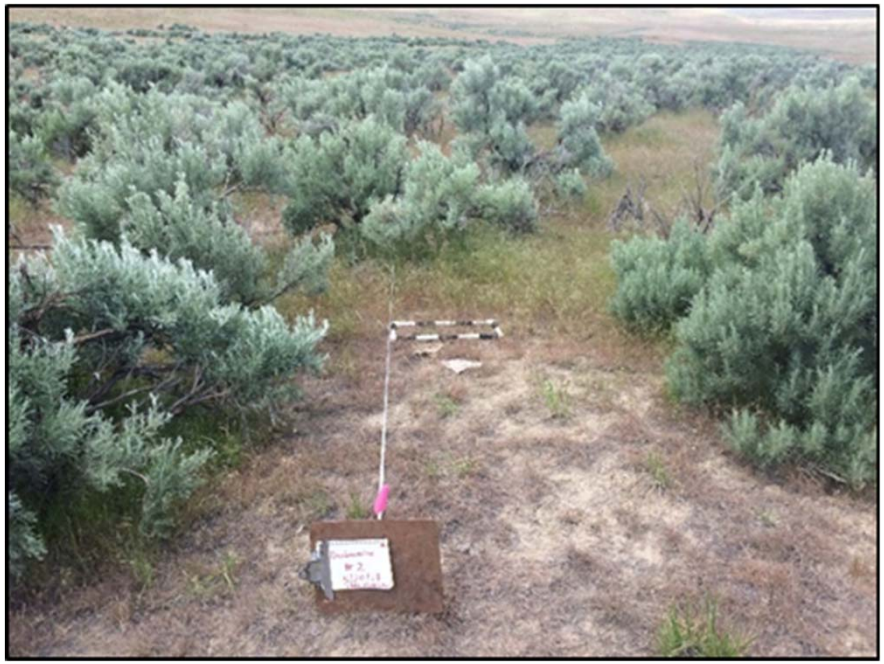


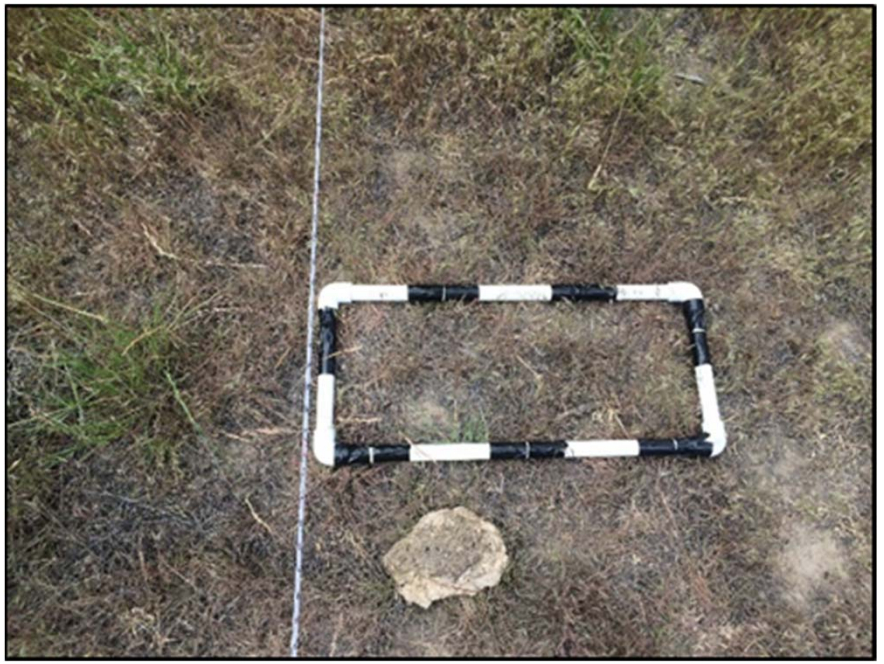


Grassy Mountain Mine Project - 2017 Baseline Vegetation Survey Report

Photo Plate 10

Daubenmire 2





Grassy Mountain Mine Project - 2017 Baseline Vegetation Survey Report

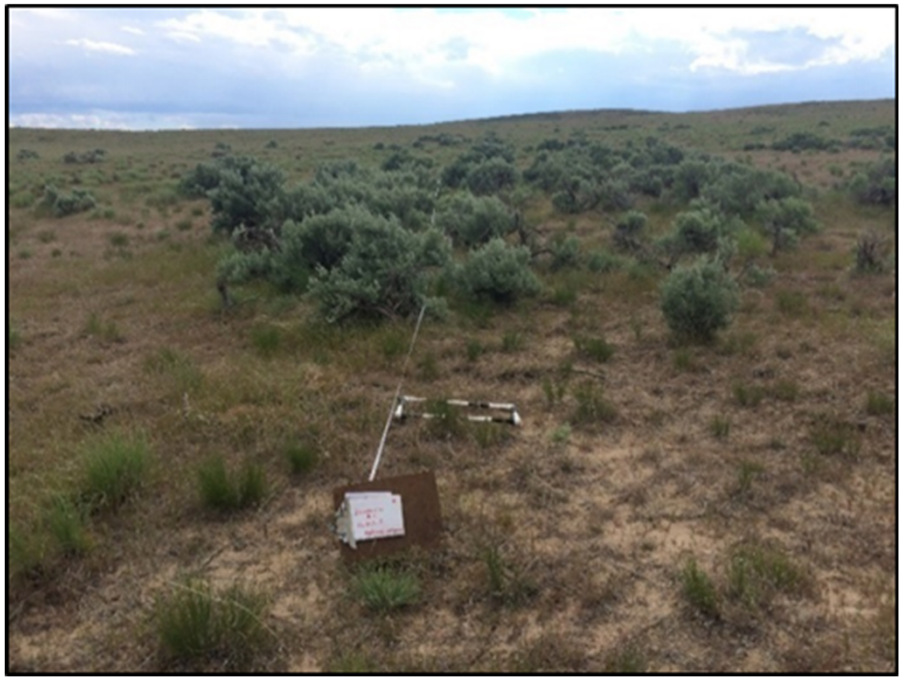
Photo Plate 11

Daubenmire 3

Grassy Mountain Mine Project - 2017 Baseline Vegetation Survey Report

Photo Plate 12

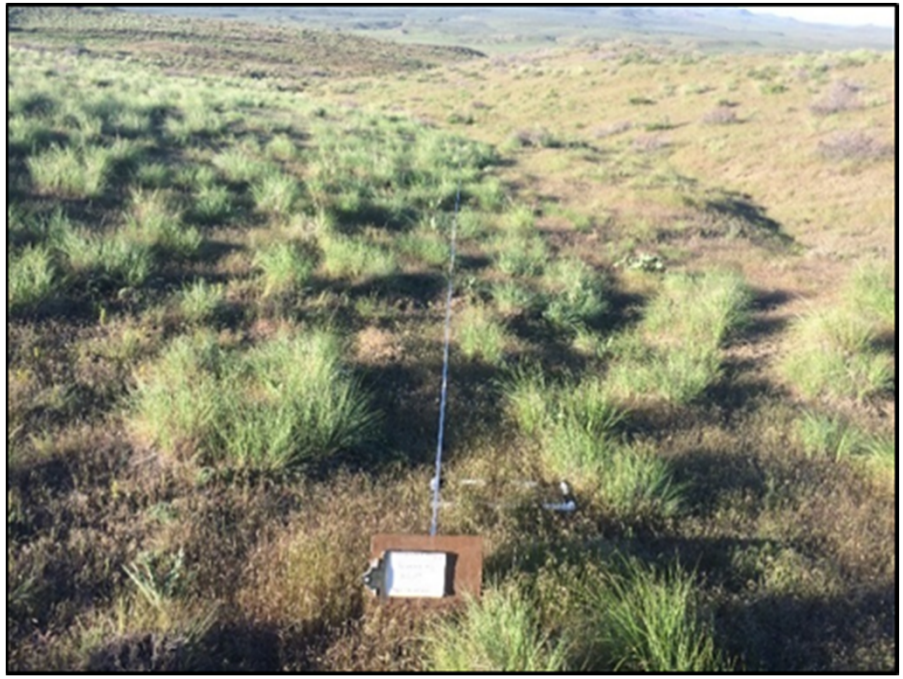
Daubenmire 4



Grassy Mountain Mine Project - 2017 Baseline Vegetation Survey Report

Photo Plate 13

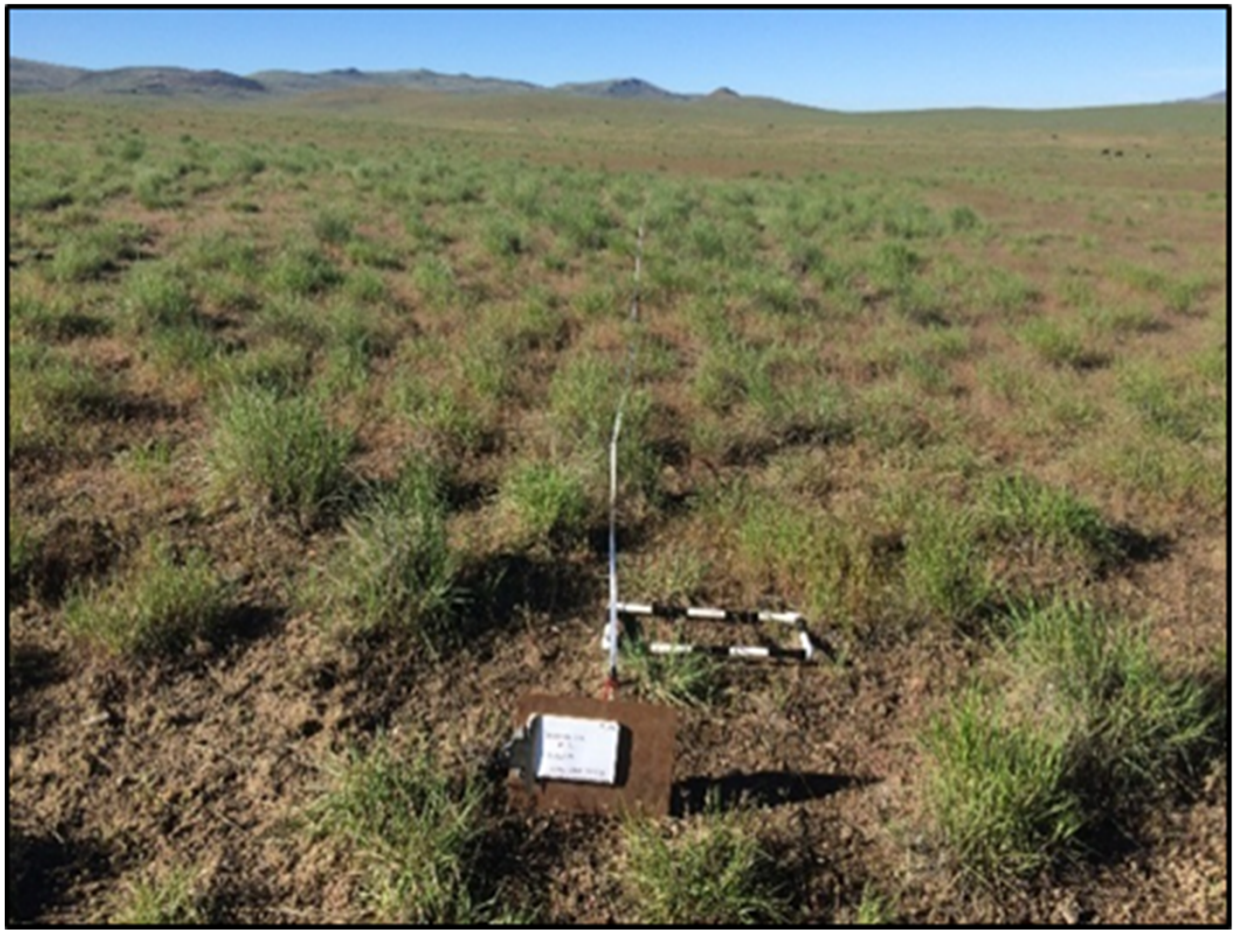
Daubenmire 5



Grassy Mountain Mine Project - 2017 Baseline Vegetation Survey Report

Photo Plate 14

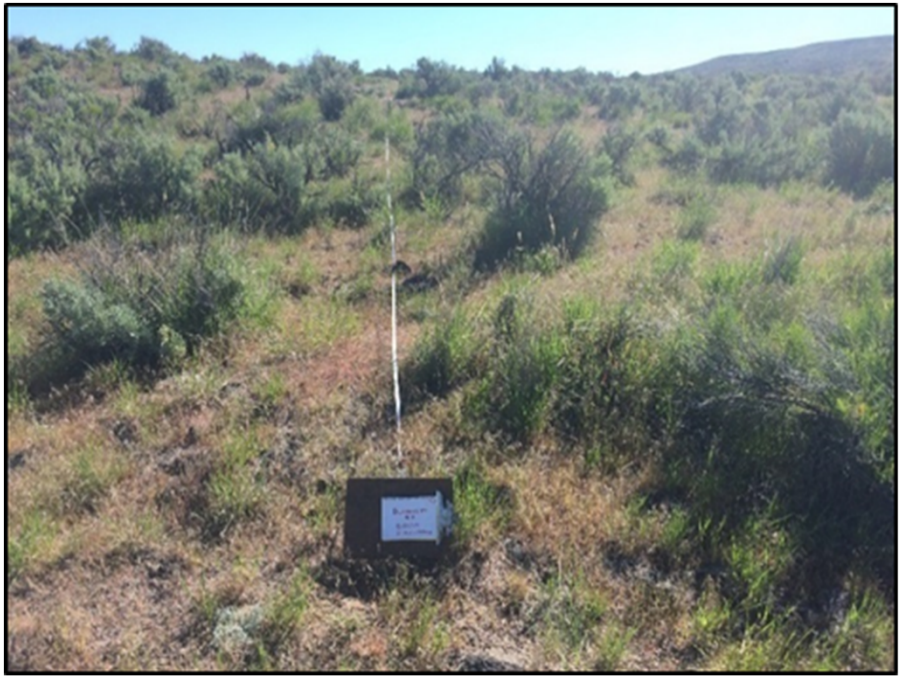
Daubenmire 6



Grassy Mountain Mine Project - 2017 Baseline Vegetation Survey Report

Photo Plate 15

Daubenmire 7



APPENDIX C

MALHEUR COUNTY NOXIOUS WEED SPECIES LIST

Public Notice
Malheur County Noxious Weed Control

WEED DISTRICT: The entire Malheur County is a weed control district known as the Malheur County Weed District. The weed district is governed by the Malheur County Court upon recommendations from the Malheur County Weed Advisory Board.

DESIGNATION OF NOXIOUS WEEDS: Pursuant to ORS 570.575 the following named plants are designated by the Malheur County Court to be injurious to public health, crops, livestock, land, or other property and are noxious.

It is the responsibility of private landowners the County, State and Federal governments to eradicate and control these weeds on their respective jurisdictions. Malheur County has prioritized control and/or eradication of these noxious weeds by "A" "B" & "C" classes, with Class A having the highest priority. Priorities may be adjusted by geographic areas at the recommendation of the Weed Advisory Board.

CLASS "A" WEED: A weed of known economic/environmental importance known to occur in the county in very small numbers to make eradication practicable, or not known to occur but its status in surrounding counties makes future occurrence seem imminent.

ACTION – infestations are subject to mandatory control/eradication where found with possible county assistance when funds are available.

COMMON NAME	*SCIENTIFIC NAME*
Austrian Peaweed	*Sphaerophysa salusula*
Common Crupina	*Crupina Vulgaris*
Big-Headed knapweed	*Centaurea macrocephala*
Buffalobur	*Solanum rostratum*
Camelthorn	*Alhagi pseudalhagi*
Dalmation toadflax	*Centaurea diffusa*
Dyers woad	*Isatis tinctoria*
Featherheaded knapweed	*Centaurea trichocephala*
Hydrilla	*Hydrilla venticillata*
Iberian starthistle	*Centaurea iberica*
Italian thistle	*Carduus pycnocephalus*
Jimsonweed	*Datera stramonium*
Johnsongrass	*Sorgum halepense*
Jointed goatgrass	*Aegilops cylindrical*

COMMON NAME	*SCIENTIFIC NAME*
Leafy spurge	*Euphorbia esula*
Meadow knapweed	*Centaurea pratensis*
Mediterranean sage	*Salvia aethiopis*
Milk thistle	*Silybum marianum*
Perennial pepperweed	*Lepidium latifolium*
Purple nutsedge	*Cyperus rotundus*
Purple starthistle	*Centaurea calcitrapa*
Rush skeletonweed	*Chondrilla juncea*
Short-fringe knapweed	*Centaurea nigrescens*
Silverleaf knightshade	*Solanum elaegnifolium*
Skeletonleaf bursage	*Ambrosia tomentosa*
Slender-flowered thistle	*Carduus tenuiflorus*
Smooth distaff thistle	*Carthamus baericus*
Spiny cocklebur	*Xanthium spinosum*
Spotted knapweed	*Centaurea maculosa*
Squarrose knapweed	*Centaurea virgata*
St. Johnswort (Klamath weed)	*Hypericum perforatum*
Sulfur cinquefoil	*Potentilla recta*
Wild proso millet	*Panicum miliaceum*
Tansy ragwort	*Senecio jacobaea*
Wooly distaff thistle	*Carthamus lanatus*
Yellow toadflax	*Linaria vulgaris*
Yellow starthistle	*Centaurea solstitialis*

* *Class "A" Weed only in that part of Malheur County south of the road leading from the junction of Malheur County line and McBride Creek Road, west to Leslie Gulch Road, to Lake Owyhee and the area south of the road leading from the Rinehart Ranch to the Crowley Road west to Highway 78, north to the Malheur County line.*

CLASS "B" WEED – A weed of known economic/environmental importance and of moderate to wide distribution and highly invasive, subject to intensive control or eradication where feasible at the county level.

ACTION – Infestations are subject to control where found, with possible county assistance when funds are available. All CLASS"B" weeds are required to be controlled within 50 feet of all property lines, easements and rights of way, pursuant to ORS 570.525

COMMON NAME	*SCIENTIFIC NAME*
Canada thistle	*Cirsium arvense*
Houndstongue	*Cynoglossum officinale*
Musk thistle	*Carduus nutans*
Perennial pepperweed	*Lepidium latifolium*
Purple loosestrife	*Lythrum salicaria*
Scotch thistle	*Onopordum acanthium*
Hoary cress (White Top)	*Lepidium spp.*
Russian knapweed	*Acroptilon repens*

** Owners or occupants having Russian knapweed are required to control a minimum 20% of their annual infestation per discreet parcel of land per year. This includes the 50 foot buffer plus additional amounts to total 20% of the infestation.

CLASS "C" WEED – A weed of known economic/environmental importance and of general distribution, that is subject to control or eradication as local conditions warrant.

ACTION – Infestations treated at landowners discretion.

COMMON NAME	*SCIENTIFIC NAME*
Bull thistle	*Cirsium vulgare*
Cheatgrass	*Bromus tectorum*
Dodder	*Cuscutta spp.*
Field bindweed	*Convolvulus arvensis*
Halogeton	*Halogeton glomeratus*
Kochia	*Kochia scoparia*
Medusahead rye	*Taeniatherum caput-medusae*
Poison hemlock	*Conium maculatum*
Puncturevine	*Tribulus terrestris*
Quackgrass	*Agropyron repens*
Common ragweed	*Ambrosia artimisiifolia*
Salt cedar	*Tamarix parviflora*
Sweet clover	*Melilotus officinalis*
Western horsetail	*Equisetum arvense*
Yellow nutsedge	*Cyperus esculentus*

APPENDIX D

COMPREHENSIVE PLANT SPECIES LIST FOR THE STUDY AREA

Grassy Mountain Mine Project
Terrestrial Vegetation Report -- Vegetation Species Observed in the Study Area

Scientific Name	Common Name	Family Name	Plant Description
Shrubs (Shrub Stratum)			
Artemisia tridentata ssp. *vaseyana*	mountain big sagebrush	Asteraceae	Perennial shrub
Chrysothamnus nauseosus	rubber rabbitbrush	Asteraceae	Perennial shrub
Chrysothamnus viscidiflorus	yellow rabbitbrush	Asteraceae	Perennial shrub
Opuntia polyacantha	plains prickly pear	Cactaceae	Perennial shrub
Rosa woodsii	Wood's rose	Rosaceae	Perennial shrub
Sarcobatus vermiculatus	greasewood	Chenopodiaceae	Perennial shrub
Forbs (Herbaceous Stratum)			
Achillea millefolium	common yarrow	Asteraceae	Perennial forb
Arnica sp.	arnica	Asteraceae	Perennial forb
Astragalus purshii	woollypod milkvetch	Fabaceae	Perennial forb
Balsamorhiza sagittata	arrowleaf balsamroot	Asteraceae	Perennial forb
Calochortus sp.	mariposa lily	Liliaceae	Perennial forb
Carduus nutans	nodding plumeless thistle	Asteraceae	Biennial/Perennial forb
Ceratocephala testiculata	curveseed butterwort	Ranunculaceae	Annual forb
Chorispora tenella	blue mustard	Brassicaceae	Annual forb
Cirsium arvense	Canada thistle	Asteraceae	Noxious weed
Cirsium undulatum	wavyleaf thistle	Asteraceae	Perennial forb
Collinsia parviflora	maiden blue eyed Mary	Scrophulariaceae	Annual forb
Comandra umbellata	bastard toadflax	Santalaceae	Perennial forb
Convolvulus arvensis	field bindweed	Convolvulaceae	Perennial forb
Crepis acuminata	tapertip hawksbeard	Asteraceae	Perennial forb
Descurainia pinnata	western tansymustard	Brassicaceae	Annual/biennial/perennial forb
Epilobium sp.	willowherb	Onagraceae	forb
Eriastrum sparsiflorum	Great Basin woollystar	Polemoniaceae	Annual forb
Eriogonum spergulinum	buckwheat	Polygonaceae	Annual forb
Haplopappus carthamoides	large-flowered goldenweed	Asteraceae	Perennial forb
Kochia scoparia	kochia	Chenopodiaceae	Annual forb
Lepidium perfoliatum	clasping pepperweed	Brassicaceae	Annual/biennial forb
Melilotus alba	white sweet clover	Fabaceae	Perennial forb
Melilotus officinalis	yellow sweet clover	Fabaceae	Perennial forb
Mentzelia albicaulis	whitestem blazingstar	Loasaceae	Annual forb
Phlox hoodii	spiny phlox	Polemoniaceae	Perennial forb
Phlox sp.	phlox	Polemoniaceae	Perennial forb
Psoralidium tenuiflorum	slimflower scurfpea	Fabaceae	Perennial forb
Rumex crispus	curly dock	Polygonaceae	Perennial forb
Sisymbrium altissimum	tall tumblemustard	Brassicaceae	Annual/biennial forb
Sphaeralcea munroana	Munro's gobemallow	Malvaceae	Perennial forb
Sphaerophysa salusula	Austrian peaweed	Fabaceae	Noxious weed
Taraxacum officinale	common dandelion	Asteraceae	Perennial forb
Tragopogon dubius	salsify	Asteraceae	Annual/biennial forb
Verbascum blattaria	moth mullein	Scrophulariaceae	Biennial forb
Zigadenus venenosus	meadow deathcamas	Liliaceae	Perennial forb
Grasses and Grass-like Plants (Herbaceous Stratum)			
Agropyron cristatum	crested wheatgrass	Poaceae	Perennial grass
Bromus tectorum	cheatgrass	Poaceae	Annual grass
Eleocharis sp.	spikerush	Cyperaceae	Monocot
Elymus caput-medusae	medusahead	Poaceae	Annual grass
Elymus elymoides	squirreltail	Poaceae	Perennial grass
Eragrostis cilianensis	stinkgrass	Poaceae	Annual grass

Scientific Name	Common Name	Family Name	Plant Description
Festuca idahoensis	Idaho fescue	Poaceae	Perennial grass
Hesperostipa comata	needle and thread	Poaceae	Perennial grass
Hordeum jubatum	foxtail barley	Poaceae	Perennial grass
Juncus sp.	rush	Juncaceae	Monocot
Leymus cinereus	basin wildrye	Poaceae	Perennial grass
Poa secunda	Sandberg bluegrass	Poaceae	Perennial grass
Polypogon monspeliensis	rabbit's foot grass	Poaceae	Annual grass
Pseudoroegneria spicata	bluebunch wheatgrass	Poaceae	Perennial grass
Vulpia microstachys	small fescue	Poaceae	Annual grass

APPENDIX E

2017 VEGETATION FIELD SAMPLING FORMS

Calico Resources Grassy Mountain Project
Vegetation* Survey *Reporting Form

Project: Calico Resources – Grassy Mountain Exploration Project	**Transect Name/#:** 1 (6 Daubenmire 6)

Field Surveyor(s): 1. Annie Overlin 2. Sarah M. Harrelson	Date: 5/21/17 Time: Weather:
Location Description: Daubenmire 6; bunchgrass/annual	GPS Coordinates N: 43.73541 E: 117.31324
Vegetation Class: (i.e., sagebrush/grassland: grassland) grassland	
Plot Size: 10'X10'	
Section, Township, Range: 23, 21S, 44E	Datum: WGS84
Land Ownership (BLM, private): BLM	Accuracy: +/- 1meter

Est. % bare ground: 15	Aspect: S
Slope: +/-15%	Vegetation Height: 18"
Disturbance (grazing, roads, etc.): fire	

Common Name	Botanical Name	Quantity
bastard toadflax	Commandra umbellata	33
prickly phlox	Phlox hoodii	13
tapertip hawksbeard	Crepis acuminata	2
bluebunch wht-grass	Pseudoregneria spicata	6
cheatgrass	Bromus tectorum	dom
slimflower scurfpea	Psoralidium tenuiflorum	10
needle & thread	Hesperostipa comata	5
thistle	Cirsium sp.	1

Calico Resources Grassy Mountain Project
Vegetation* Survey *Reporting Form

TES Species Observed (circle one): **YES** **NO**

☐ USFWS
☐ BLM
☐ State of Oregon

Common Name	Botanical Name	Quantity

Population Notes:

Noxious Weeds/Invasive Species Observed (circle one): **YES** **NO**

☐ Class A
☐ Class B
☒ Class C

Common Name	Botanical Name	Quantity
Cheatgrass	Bromus tectorum	dom

Population Notes:

Additional Vegetation Survey Notes:

Cheatgrass forms a mat of cover; Not able to count individual plants

Site Photographs (include photo #, brief description and direction):

Photos 5945, 5946 Annie Overlin

Calico Resources Grassy Mountain Project
Vegetation Survey *Reporting Form*

Project: Calico Resources – Grassy Mountain Exploration Project	**Transect Name/#:** 2

Field Surveyor(s): 1. Annie Overlin 2. Sarah M. Harrelson	Date: 5/21/17 Time: Weather:
Location Description: @ Doubenmire 6 Crested wheat seeding	GPS Coordinates N: 43.70473 E: 117.36408
Vegetation Class: (i.e., sagebrush/grassland: grassland) grassland	
Plot Size: 10' X 10'	
Section, Township, Range: 32, 21S, 44E	Datum: WGS84
Land Ownership (BLM, private): BLM	Accuracy: +/- 1 meter

Est. % bare ground: 40	Aspect: North
Slope: 10%	Vegetation Height: 12-18"
Disturbance (grazing, roads, etc.): fire, grazing	

Common Name	Botanical Name	Quantity
Crested wheatgrass	Agropyron cristatum	33
Cheatgrass	Bromus tectorum	dom
Curvested buttercup	Ceratocephala testiculata	dom
gooseberryleaf globemallow	Sphaeralcea grossulariifolia	2
Small fescue	Vulpia microstachys	100

Calico Resources Grassy Mountain Project
Vegetation* Survey *Reporting Form

TES Species Observed (circle one): **YES** **NO**

☐ USFWS
☐ BLM
☐ State of Oregon

Common Name	Botanical Name	Quantity

Population Notes:

Noxious Weeds/Invasive Species Observed (circle one): **YES** **NO**

☐ Class A
☐ Class B
☒ Class C

Common Name	Botanical Name	Quantity
Cheatgrass	Bromus tectorum	dom

Population Notes:

Additional Vegetation Survey Notes:

Cheatgrass forms a mat; unable to count indindual plants

Site Photographs (include photo #, brief description and direction):

photos 5947, 5948 Annie Overlin

Calico Resources Grassy Mountain Project
Vegetation Survey *Reporting Form*

Project: Calico Resources – Grassy Mountain Exploration Project	**Transect Name/#:** 3

Field Surveyor(s): 1. Annie Overlin 2. Sarah M. Harrelson	Date: 5/21/17 Time: Weather:
Location Description: @ Daubenmire 7 mtn sagebrush / crested wheat	GPS Coordinates N: 43.679957 E: 117.362163
Vegetation Class: (i.e., sagebrush/grassland: grassland) Sagebrush / grassland	
Plot Size: 10' x 10'	
Section, Township, Range: 5, 22S, 44E	Datum: WGS 84
Land Ownership (BLM, private): BLM	Accuracy: +/- 1 meter

Est. % bare ground: 5	Aspect: NW
Slope: 5-60%	Vegetation Height: 3-5'
Disturbance (grazing, roads, etc.): fire / grazing	

Common Name	Botanical Name	Quantity
Crested wheatgrass	Agropyron cristatum	47
Cheatgrass	Bromus tectorum	dom
Sandberg's bluegrass	Poa secunda	32
mountain big sagebrush	Artemisia tridentata ssp. vaseyana	1
Astragalus	Astragalus sp.	1

Calico Resources Grassy Mountain Project
Vegetation* Survey *Reporting Form

TES Species Observed (circle one): **YES** **NO**

☐ USFWS
☐ BLM
☐ State of Oregon

Common Name	Botanical Name	Quantity

Population Notes:

Noxious Weeds/Invasive Species Observed (circle one): **YES** **NO**

☐ Class A
☐ Class B
☒ Class C

Common Name	Botanical Name	Quantity
Cheatgrass	Bromus tectorum	dom

Population Notes:

Additional Vegetation Survey Notes:

Cheatgrass forms a mat; unable to count individuals

Site Photographs (include photo #, brief description and direction):

photos 5953, 5954, 5955 Annie Overlin

N 48.87277

Daubenmire W 117.27930

Page 1 of 1

Study Number	Date 5/20/17	Examiner A. Overlin	Allotment Name & Number Annual grass	Pasture

Transect Number and Location: Daubenmire #1; 50ft west of Twin Spring Rd. | Number of Quadrats: 50

Plant Species	Quadrat																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
~~AG~~ BRTE	5	4	5	4	5		1	2	4	5	4	3	4	3	3	4	4	5	3	4	3	4	3	4	3
POSE	1	2	1	2	1	3	4	4	1	1	2	2	1	2	3	3	3	1	4	3	2	2	3	3	4
SIAL				1																					
~~GA~~																									

Plant Species	Quadrat																								
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
BRTE	3	2	3	3	4	4	5	5	2	1	1	2	3	1	3	1	1		1		1	2	3	1	
POSE	4	4	1	4	3			1		5	5	5	3	5	4			5	5	5	5	1	1	1	2
SIAL			3			1	1		1							1	1								
CANU						2			1																
RATE									1																

Illustration 9

Daubenmire Summary

Study Number | Date 5.20.17 | Examiner A. Overlin | Allotment Name & Number Annual grass | Pasture

Study Location Daubenmire #1 Soft W. of Twin Springs Rd. | Number of Quadrats 50

Cover Class	Mid-Point	Species BRTE		Species POSE		Species SIAL		Species CANU		Species RATE		Species		Species		Species		Species		Species		Species	
		Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product
1 1-5%	2.5	9	225	12	30	6	15	1	2.5	1	25												
2 5-25%	15	5	75	8	120	0		1	15														
3 26-50%	37.5	13	487.5	9	337.5	1	37.5																
4 51-75%	62.5	12	750	8	500																		
5 76-95%	85	7	595	8	680																		
6 96-100%	97.5																						
Total canopy			1930.5		1667.5		52.5		17.5		2.5												
Number of Samples			50		50		50		50		50												
% canopy cover			39		33		1		.35		.05												
Species composition			53		45		1.4		.5		.07												
Frequency			92		90		14		4		2												

Illustration 10

Daubenmire N. 43.86094 W. 117.27670

Page 1 of 2

Study Number	Date	Examiner	Allotment Name & Number	Pasture
Daubenmire 2	5/20/17	A. Overlin	sagebrush/ bunchgrass	

Transect Number and Location: -30ft west of Access Road

Number of Quadrats: 50

Plant Species	Quadrat 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
ARTR V						4	3	1							2	2	2		1						
CHV I																									
POSE	4	3	4	2	3		1	3	1	2	2	3	3	2	1	1	2		3	4	4	1	3	3	2
AGSP																									
ERSP																	3								
BRTE	1	1	1	4	4	1	2	4	4	4	3	4	3	4	3	3	2	2	1	2	1	4	2	1	4

Plant Species	Quadrat 26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
ARTR V			1	4	3		2			2	5							2		1			1	1	
CHV I																									3
POSE	2	2	2		1	1		3	3						3	1	4	1	2	2	4	2	3		
BRTE	3	3	2	2	3	1	1	2	2	3	3	4	4		2	4	2	4	3	3	1	3	1	3	2

Illustration 9

Daubenmire Summary

Study Number	Date 5.20.17	Examiner A. Overlin	Allotment Name & Number burned area sagebrush/grass	Pasture
Study Location Daubenmire 2				Number of Quadrats 50

Cover Class	Mid-Point	Species ARTRV Number	ARTRV Product	Species CHVI Number	CHVI Product	Species POSE Number	POSE Product	Species AGSP Number	AGSP Product	Species ERSP Number	ERSP Product	Species BRTE Number	BRTE Product	Species Number	Species Product	Species Number	Species Product	Species Number	Species Product	Species Number	Species Product	Species Number	Species Product
1 1-5%	2.5	6	15		0	8	20	9	22.5			11	27.5										
2 5-25%	15	6	90		0	12	180	8	120			12	180										
3 26-50%	37.5	2	75	1	37.5	12	450	1	37.5	1	37.5	13	488										
4 51-75%	62.5	2	125		0	6	375					13	813										
5 76-95%	85	1	85		0																		
6 96-100%	97.5																						
Total canopy			390		37.5		1025		180		37.5		1568										
Number of Samples			50		50		50		50		50		50										
% canopy cover			8		1		21		4		1		30										
Species composition			13		2		33		6		2		47										
Frequency			34		2		76		36		2		98										

Illustration 10

N 43.79958

Daubenmire W 117.31617 Was Sagebrush

Study Number	Date 5/20/17	Examiner A. Overlin	Allotment Name & Number Burned CHVI burngrass	Pasture

Transect Number and Location: Daubenmire 3; 300ft. East of Twin Springs Rd.

Number of Quadrats: 50

Plant Species	Quadrat																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
BRTE		1	1	1	1			1	1	1		1	1	1	1	1	2	1	2	1	1	1	1	1	2
POSE	3	3	2	2	3	3	2	3	3	2	2	2	3	3	2	2	1	2	2	2	2	1	2	2	2
AGSP			2						2	3			2	2	2	2	3					2	2		
CHVI	2			3		2	1				1				1										
EL EL								1				1						2							
ERCI																			1						
LECI																				1		3		2	
LEPE																									1

Plant Species	Quadrat																								
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
BRTE	1	1	1	1	1	2	1	1	1	2	1	1	1	2		1	1	2	1			1		1	1
POSE	2	3	3	2	3	2	3	1	2	2	2	3	3	2	1	2	3	2	3	3	2	2	2	2	3
AGSP	2			2			2	3	1			1			2	2			1		2		2	2	1
CHVI									1						1				1	1					
ERCI																1				1				1	

Daubenmire Summary

Study Number	Date 5.20.17	Examiner A. Overlin	Allotment Name & Number	Pasture
Study Location Daubenmire #3 was sagebrush, burned, now CHVI + bunchgrass, seeded				Number of Quadrats 50

Cover Class	Mid-Point	Species BRTE		Species POSE		Species AGSP		Species CHVI		Species ERCI		Species ELEL		Species LECI		Species LIPE		Species		Species		Species	
		Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product
1 1-5%	2.5	35	87.5	4	10	4	10	7	17.5	4	10	2	5	1	2.5	1	2.5						
2 5-25%	15	7	105	28	420	16	240	2	30			1	15	1	15								
3 26-50%	37.5			18	675	3	112.5	1	37.5					1	37.5								
4 51-75%	62.5																						
5 76-95%	85																						
6 96-100%	97.5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–							
Total canopy			192.5		1105		362.5		85		10		20		55		2.5						
Number of Samples			50		50		50		50		50		50		50		50						
% canopy cover			4		22		7		2		–		–		1		–						
Species composition			11		60		20		5		1		1		3		–						
Frequency			84		100		46		20		8		6		6		2						

Illustration 10

[redacted]

Daubenmire

N 43.75393
W 117.31122

Page 1 of 1

Study Number	Date	Examiner	Allotment Name & Number	Pasture
Daubenmire 4	5/20/17	A. Overlin	Sagebrush bunchgrass	

Transect Number and Location: 100yds West of Intersection of TW in spring & Mitchell Butte Rd.

Number of Quadrats: 50

Plant Species	Quadrat																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
ARTRV				1	3	2		4	3	3			3	2	2		2	3					3		
POSE	2	2	3	3	1	3	1	2	2	2	3		2		2	3	3	2	2	1		1		1	1
BRTE	2	1	1	1	1	1		1	1	1	1			1	1	1	2	2	2	2		2	2		
VUMI							2				1	2	1	2									1	3	3
FEID			1		1		2					2							1	2				1	
HECO26																							1		
DEPI																									

Plant Species	Quadrat																								
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
ARTRV		5	4	2																					
POSE	1		1	1	3	2	1	2	1	3	2	2	1	2	3	2	2	1	2	2	1	1	2	2	2
BRTE		1	2	1	1	3	3	2	3	2		1	1	1	1	1		X	1	1	1	1	2	2	1
VUMI				2														1							
FEID	3	1		1	1					1			2				1			1	2		1		1
HECO26		1		1													1			1					
DEPI		1																							
SIAL											1														
ELEL																					1	1			

Illustration 9

Illustration 10

Daubenmire Summary

Study Number	Date 5.20.17	Examiner A. Overlin	Allotment Name & Number Sagebrush bunchgrass	Pasture
Study Location Daubenmire #4				Number of Quadrats 50

Cover Class	Mid-Point	Species ARTR		Species ~~ABRT~~ BRTE		Species POSE		Species VUMI		Species FEID		Species DEPI		Species HELO26		Species SIAL		Species ELEL		Species		Species	
		Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product
1 1-5%	2.5	1	2.5	25	62.5	15	37.5	4	10	12	30	2	5	4	10	1	2.5	2	5				
2 5-25%	15	5	75	12	180	21	315	4	60	4	60												
3 26-50%	37.5	6	225	3	112.5	9	337.5	2	75	1	37.5												
4 51-75%	62.5	2	125																				
5 76-95%	85	1	85																				
6 96-100%	97.5		-	-	-	-		-		-		-		-		-		-					
Total canopy			512.5		355		690		145		127.5		5		10		2.5		5				
Number of Samples			50		50		50		50		50		50		50		50		50				
% canopy cover			10		7		14		3		3		-		-		-		-				
Species composition			28		19		37		8		7		-		1		-		-				
Frequency			30		80		90		20		34		4		8		2		4				

Illustration 9

Daubenmire

N 43.73541
W 117.31324

Page 1 of 3

Study Number	#5 Dans	Date	5/21/17	Examiner	AD	Allotment Name & Number		Pasture	
Transect Number and Location	Bunchgrass / cheatgrass					Number of Quadrats	50		

Plant Species	Quadrat																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
AGSP	1	2		3		2				2	4	1	2			2	3	1	2	3	3	3	3		
BRTE	5	4	3	2	4	2	2	3	2	3	3	3	3	5	5	3	2	3	3	3	2	2	2	2	2
HECO26					1	1																			
BASA											1														
CRAC		1																							
POSE			1										2					2	1		1	2	1		
PHHO				2	1		1																		
RATE				1																					
COUM				1		1																			
CHVI						1																			
VUMI									1										1						
MEAL																									1

Plant Species	Quadrat																								
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
AGSP	4	1			4	1	2	2	2	3	3	2													
BRTE	1	3	5	3	2	5	2	2	1	2	1	4	5	4	4	4	4	3	3	3	3	4	4	4	3
POSE			1	1					1		1									1	!				
CRHC				2					1	2															
PSTES													1												
~~DEC~~ MEAL													1	1							!	1			1
HECO26																	1	2	1						
CHVI																			1						
ERCI																				1					
Calochortus																				1					
																					1				

Illustration 10

Daubenmire Summary

Study Number	Date 5.21.17	Examiner	Allotment Name & Number	Pasture
Study Location Daubenmire 5 100 yrds East of Twin Springs Rd			Number of Quadrats 50	

Cover Class	Mid-Point	Species AGSP		Species BRTE		Species HECO26		Species BASA		Species CRAC		Species POSE		Species PHHO		Species BOUNCHgrass/annual grass RATE		Species COUM		Species CHVI		Species VUMI	
		Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product
1 1-5%	2.5	5	12.5	4	10	4	10	1	2.5	3	7.5	9	22.5	2	5	1	2.5	2	5	3	7.5	1	2.5
2 5-25%	15	10	150	14	210	1	15			3	45	2	30	1	15		30						
3 26-50%	37.5	7	262.5	16	600																		
4 51-75%	62.5	2	125	10	625																		
5 76-95%	85			6	510																		
6 96-100%	97.5				-		-																
Total canopy			550		1955		25		2.5		52.5		52.5		20		32.5		5		7.5		2.5
Number of Samples			50		50		50		50		50		50		50		50		50		50		50
% canopy cover			11		39		1		-		1		1		-		1		-		-		-
Species composition			20		72		1		-		2		2		1		1		-		-		-
Frequency			48		100		10		2		12		22		6		2		4		6		2

2727.5

Cont.

Daubenmire Summary

Page 3 of 3

Study Number	Date 5.21.17	Examiner A. Overlin	Allotment Name & Number	Pasture
Study Location	Daubenmire #5 cont.		Number of Quadrats	50

Cover Class	Mid-Point	Species		Species		Species		Species		Species		Species		Species		Species		Species		Species		Species	
		MEAL		POSTES		ERCF		Calochortus															
		Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product
1 1-5%	2.5	6	15	1	2.5	1	2.5	1	2.5														
2 5-25%	15																						
3 26-50%	37.5																						
4 51-75%	62.5																						
5 76-95%	85																						
6 96-100%	97.5																						
Total canopy			15		2.5		2.5		2.5														
Number of Samples			50		50		50		50														
% canopy cover			—		—		—		—														
Species composition			1		—		—		—														
Frequency			12		2		2		2														

Illustration 10

1% rock
10% litter
40 So bare ground

4/9% grass
- no shrubs

N 43.70473
W 117.36408

Daubenmire

Page 1 of 2

Study Number	Date 5/21/17	Examiner	Allotment Name & Number	Pasture

Transect Number and Location Daub. 6 Crested Wht Seeding | Number of Quadrats 50

Plant Species	Quadrat																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
AGSP	1	1	3	3	2	2	2	2	2	1	3	4	4	2	3	1	1	3	3	2	2	3	2	2	1
BRTE	1	2	1	2	2	2	2	2	2	2	2	1	2	1	1	1	1	1	2	2	1	1	1	1	1
RATE	1	2	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
POSE						2					1		1	1	2	2	2					1		1	1

Plant Species	Quadrat																								
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
AGSP	1	2	3		3			2	2	1		3			1	1	1	2		1	2	2	3		
BRTE	1	1	1	1	2	1	1	1	2	1	2		2	3	3	2	2	3	2	3	2	1	2	2	2
RATE	1	1	2	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1
POSE		2							1				1				1		1		2			1	
AGSP							4	1																	

Illustration 9

Daubenmire Summary

Study Number	Date 5.21.17	Examiner A. Overlin	Allotment Name & Number	Pasture
Study Location Daubenmire #6 Crested wheat seeding				Number of Quadrats 50

Cover Class	Mid-Point	Species AGCR		Species BRTE		Species RATE		Species POSE		Species AGSD		Species		Species		Species		Species		Species		Species	
		Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product
1 1-5%	2.5	12	30	22	55	46	115	8	20	1	2.5												
2 5-25%	15	16	240	23	345	4	60	6	90														
3 26-50%	37.5	11	412.5	4	150																		
4 51-75%	62.5	2	125							1													
5 76-95%	85																						
6 96-100%	97.5	–	–	–	–	–	–	–	–	–	–												
Total canopy			807.5		550		175		110		2.5												
Number of Samples			50		50		50		50		50												
% canopy cover			16		11		4		2		–												
Species composition			49		33		11		7		–												
Frequency			82		98		100		28		4												

Illustration 10

N 43.607957
W 117.36263

Daubenmire

Study Number	Date 5/21/17	Examiner	Allotment Name & Number	Pasture

Transect Number and Location: Daub. 7 Mtn. Sagebrush crested wht

Number of Quadrats: 50

Plant Species	Quadrat																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
AGSP	2	1	2	2		2	2	2		2	3	1		3	1	3		2							
POSE	2	2	2	1	1	1		1	2					1	3							1	2	1	
BRTE	1	1	2	2	2	1	2	2	2	2	1	3	3	2		2	3	2	3	3	1	3	2	2	X 3
RATE	1	1		1	1		1	1																	
ARTRV									2	2															
Eriogonum sp		1																					2		
ASPU			2																						
ZEVE					1			1				X	2		2		1								1
AGSP									2	1									2	X	4				
COPA									1	1	1														
CHVI															1										

Plant Species	Quadrat																							
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
AGSP		1						2	2	3	1		2	1	2	3		1	3		2			1	1
POSE	1	1								1			1	1	2				1	1				2	2
BRTE	3	3	2	3	2	2	2	2	X 4	2	3	5	2	1	1	2	3	3	1	X 3	3	2	2	2	2
ARTRV		1																							
AGSP					2	2	3	1																	
RATE					1	1	1								1	1						1	1		
LEPE														1											

Illustration 9

Daubenmire Summary

Page 2 of 2

Study Number	Date 5.21.17	Examiner A. Overlin	Allotment Name & Number	Pasture
Study Location Daubenmire #7 sagebrush & crested wheat			Number of Quadrats 50	

Cover Class	Mid-Point	Species AGCR		Species POSE		Species BRTE		Species RATE		Species ARTRV		Species Erigeron		Species ASPU		Species ZIVE		Species AGSO		Species COPA		Species CHVI		Species LEPE
		Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	
1 1-5%	2.5	9	22.5	14	35	8	20	13	32.5	1	2.5	1	2.5			3	7.5	3	7.5	3	7.5	1	2.5	1
2 5-25%	15	13	195	8	120	24	360			3	45			2	30	2	30	4	60					
3 26-50%	37.5	6	225	1	37.5	15	562.5											1	37.5					
4 51-75%	62.5					1	62.5											1	62.5					
5 76-95%	85					1	85																	
6 96-100%	97.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Total canopy		442.5		1925		1090		32.5		47.5		2.5		30		37.5		1,167.5		7.5		2.5		2.5
Number of Samples		50		50		50		50		50		50		50		50		50		50		50		50
% canopy cover		9		4		22		1		1		—		1		1		2		—		—		
Species composition		22		9		53		2		2		—		1		2		8		—		—		—
Frequency		56		46		98		26		8		2		4		10		18		6		2		1

total = 1250.5

Illustration 10

APPENDIX F

USFWS IPAC CONSULTATION LETTER

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oregon Fish And Wildlife Office
2600 Southeast 98th Avenue, Suite 100
Portland, OR 97266-1398
Phone: (503) 231-6179 Fax: (503) 231-6195
https://www.fws.gov/oregonfwo/articles.cfm?id=149489416

In Reply Refer To: December 01, 2017
Consultation Code: 01EOFW00-2018-SLI-0114
Event Code: 01EOFW00-2018-E-00212
Project Name: Grassy Mountain

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the

human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to investigate opportunities for incorporating conservation of threatened and endangered species into project planning processes as a means of complying with the Act. If you have questions regarding your responsibilities under the Act, please contact the Endangered Species Division at the Service's Oregon Fish and Wildlife Office at (503) 231-6179. For information regarding listed marine and anadromous species under the jurisdiction of NOAA Fisheries Service, please see their website (http://www.nwr.noaa.gov/habitat/habitat_conservation_in_the_nw/habitat_conservation_in_the_r).

Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Oregon Fish And Wildlife Office
2600 Southeast 98th Avenue, Suite 100
Portland, OR 97266-1398
(503) 231-6179

Project Summary

Consultation Code: 01EOFW00-2018-SLI-0114

Event Code: 01EOFW00-2018-E-00212

Project Name: Grassy Mountain

Project Type: MINING

Project Description: Exploration project permit area and access road

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/place/43.78722054961776N117.31858383599294W

Counties: Malheur, OR

Endangered Species Act Species

There is a total of 0 threatened, endangered, or candidate species on this species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

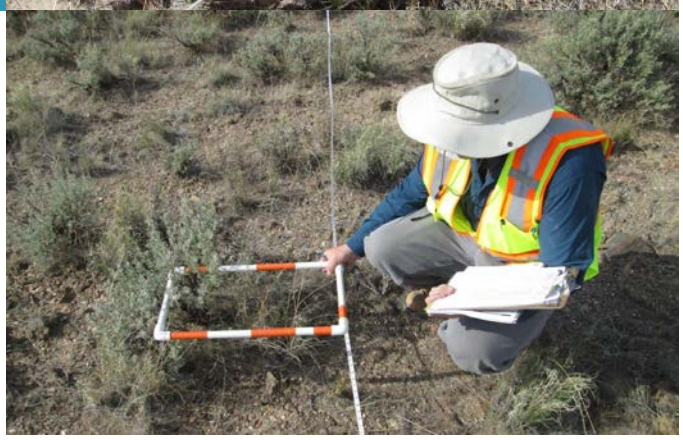
APPENDIX G

ORBIC DATA RESPONSE, APRIL 21, 2017

CONFIDENTIAL – SUBMITTED SEPARATELY

ATTACHMENT A

DRAFT TERRESTRIAL VEGETATION BASELINE STUDY, MAY 2014
DRAFT TERRESTRIAL VEGETATION BASELINE STUDY ADDENDUM #1, JULY 2015
BY HDR ENGINEERING, INC.



Draft Terrestrial Vegetation Baseline Study

Grassy Mountain Exploration Project

Calico Resources USA Corporation

Malheur County, Oregon

May 2014

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Appendices

Acronyms

Atlas	Atlas Precious Metals
BLM	Bureau of Land Management
Calico	Calico Resources USA Corporation
ESA	Endangered Species Act
GPS	global positioning system
HDR	HDR Engineering, Inc.
NEPA	National Environmental Policy Act
NMC	Newmont Grassy Mountain Corporation
NRCS	Natural Resources Conservation Service
OAR	Oregon Administrative Rules
OBDIC	Oregon Biodiversity Information Center
ODA	Oregon Department of Agriculture
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
ORNHP	Oregon Natural Heritage Program
ORS	Oregon Revised Statutes
POO	plan of operations
TES	threatened and endangered species
TRT	technical review team
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service

Section 1: Introduction

1.1 Purposes and objectives

The purpose of the terrestrial vegetation baseline study is to characterize existing conditions prior to the start of proposed mining operations at the Calico Resources USA Corporation (Calico) Grassy Mountain Exploration Project, located in Malheur County, Oregon. This study characterizes the pre-project terrestrial vegetation communities, including species diversity; presence or absence of federally-listed threatened, endangered and sensitive (TES) species; Oregon and Bureau of Land Management (BLM) sensitive species; and condition and presence of noxious weeds. HDR Engineering, Inc. (HDR) has prepared this vegetation study to meet the following objectives:

- Describe field procedures, methodologies and documentation requirements used in the field surveys to characterize existing vegetation baseline conditions at the mine and mill sites and access road corridor, as well as the regional setting, as it relates to the predominant terrestrial vegetation communities.
- Describe methodology used to inventory vegetation.
- Identify other current land uses which could affect the condition of existing terrestrial vegetation resources at the site (i.e., grazing).
- Survey and record potential threatened, endangered, candidate, and sensitive plant species within the project area.
- Survey for noxious weeds that occur in the project area and describe potential management options for controlling weeds while constructing and operating a mine at the site.

A key goal of this study is to develop a baseline program focused on natural revegetation, wildlife habitat restoration, and reclamation at the end of the potential mine life.

1.2 Project Background

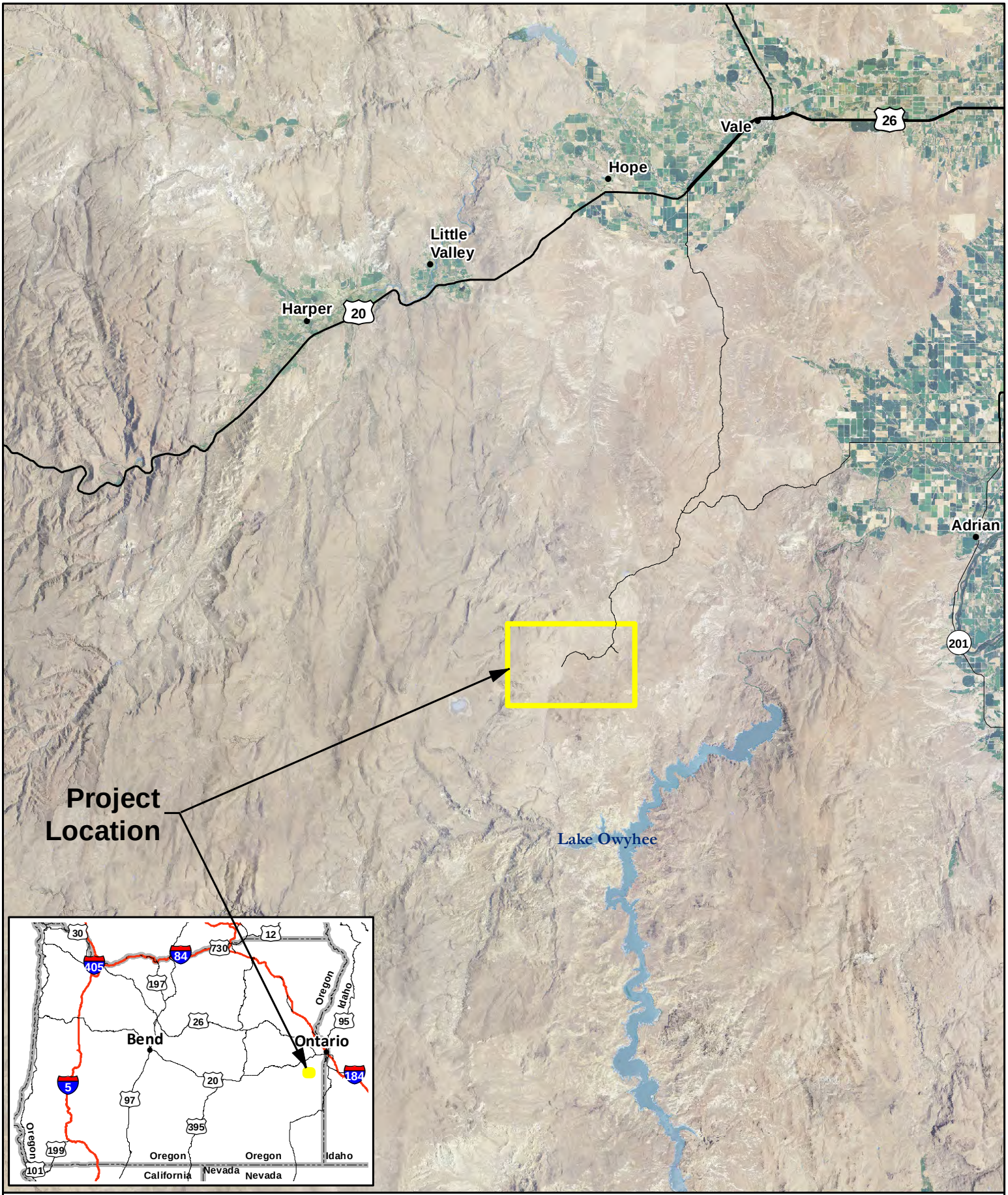
As shown in **Figure 1-1**, the Grassy Mountain project is located in Malheur County, Oregon, about 25 miles south-southwest of Vale. The mine is located on three patented lode mining claims that cover an estimated 62 acres. The three patented lode claims are part of a larger land position defined as three patented lode claims; 419 un-patented lode claims managed by BLM; and 1,300 acres of the land, including six association placer claims all controlled by Calico.

The Grassy Mountain project area is shown in **Figure 1-2**. The proposed action would potentially directly and indirectly affect up to 388 acres of upland plant species. This includes the mine area, processing facilities and tailings disposal, and haul road between the mine area and processing facility. More specifically, the project study area is broken down as follows:

- Project mine area – 62 acres
- Processing facility and tailings disposal – 281 acres
- Access road – 45 acres

The project area encompasses portions of Section 32, Township 21 South, Range 44 East; Sections 1 and 12, Township 22 South, Range 43 East; Sections 5, 6, 7, and 8, Township 22 South, Range 43 East.

The project is accessed via Highway 20, west from Vale, Oregon, to Rock Creek Road. The site is approximately 25 to 30 miles up Rock Creek Road.



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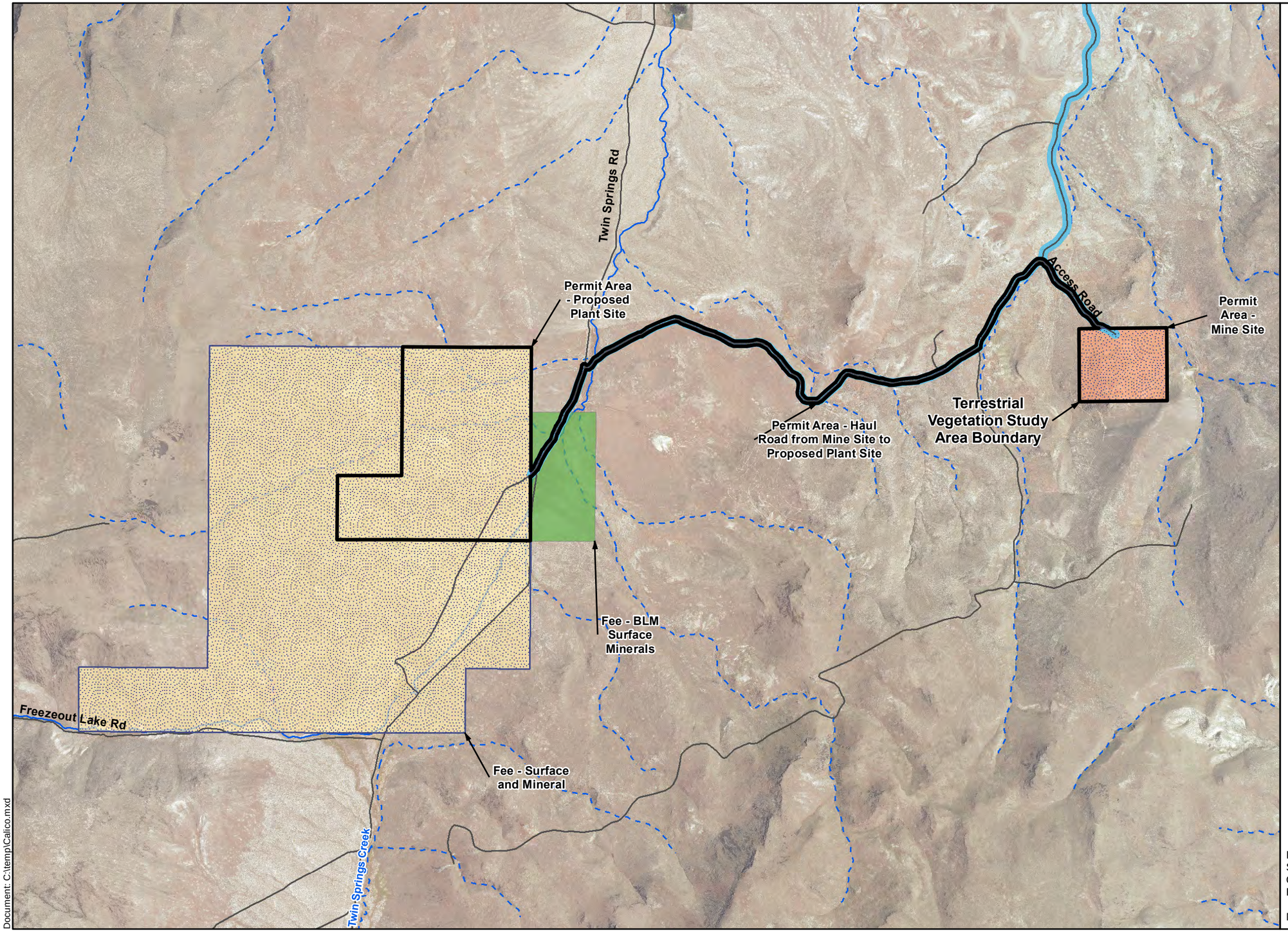
Miles

Figure 1-1. Vicinity Map
Calico Resources, Grassy Mountain Project
Malheur County, OR

Imagery: 2012 NAIP 1 meter resolution
Source: NRCS/USDA Digital Gateway
Other Data Sources: USGS; US Census Bureau

Map Production Date: 5/19/2014
Document: Q:\CalicoResources\GrassyMountain\map_docs\Vicinity_LetPort.mxd



Legend

- Permit Area
- Road to be Upgraded
- Terrestrial Vegetation Study Area
- Public Roads
- Perennial Stream
- Intermittent/Ephemeral Stream

Calico Resources Properties/Interests

- Fee - BLM Surface Mineral
- Fee - Surface and Mineral
- Patented Claims - Surface and Mineral

0 2,000 4,000
Feet

Imagery: 2011 NAIP 1 meter resolution
Source: NRCS/USDA Digital Gateway
Other Data Sources: BLM, Oregon Department of Fisheries, USGS, US Fish and Wildlife Service

Map Production Date: 12/10/2012

Document: C:\temp\Calico.mxd

Figure 1-2. Project Area Map
Calico Resources, Grassy Mountain Project
Malheur County, OR

Section 2: Resource Study Area

The study area for terrestrial vegetation resources includes the entire project area shown on **Figure 1-2** and covers approximately 388 acres.

Terrestrial vegetation in the study area is a typical, cold-desert type. Vegetation communities include big sagebrush/bunchgrass community, crested wheatgrass/annual community, annual grassland community, and wetland area(s). Invasive species such as cheatgrass (*Bromus tectorum*) and/or medusahead (*Taeniatherum caput-medusae*) dominate most of the vegetation communities.

Much of the study area consists of rocky rangeland with numerous rock outcroppings. Most of the area has been affected by extensive cattle grazing, fire, and range reseeding programs. Access roads are also present throughout much of the study area.

Section 3: Methodology

The environmental baseline data methodology for terrestrial vegetation resources was prepared to meet the requirements of Oregon Administrative Rules (OAR) 632-037-0055, 632-037-0040 and OAR 635, Division 420.

- The federal program to control the spread of noxious weeds as addressed in the Federal Noxious Weed Act of 1974, as amended in 1990 by the U.S. Fish and Wildlife Service (USFWS). BLM Manual 9011 (2007), BLM Handbook H-9011-1 (1994), and BLM Manual 9014 (1990) provide policy for the planning and implementation of biological controls within an integrated pest management program. These policies further require that all ground disturbing projects are evaluated to determine the risk of introducing or spreading noxious weeds.
- The National Environmental Policy Act (NEPA) is expected to be employed in components or all of the mining and processing operations. This baseline study is intended to meet all applicable federal guidelines, as described in the BLM NEPA Handbook H-1790-1 (2008).
- OAR 635, Division 420 rules prescribe the standards for the Oregon Department of Fish and Wildlife (ODFW) to review of proposed chemical process mining operations for the purpose of developing conditions for protection of wildlife and their habitat, to further the Wildlife Policy (ORS [Oregon Revised Statutes] 496.012 and Food Fish Management Policy (ORS 506.109) of the State of Oregon.

3.1 Oregon Administrative Rules

OAR 632, Division 037, Section 0130 Reclamation and Mine Closure Standards that pertain to revegetation include the following:

- Surface reclamation of a chemical process mine shall require certification by ODFW and the Oregon Department of Agriculture (ODA) that a self-sustaining ecosystem, comparable to undamaged ecosystems in the area, has been established to satisfy the permittee's habitat restoration obligations.
- Native species shall be established unless the use of non-native species is justified and approved by the technical review team (TRT).
- Seed mixtures, fertilizer rates and other requirements will be derived from departmental experience and advice from such sources as ODA, Natural Resources Conservation Service (NRCS) (formerly U.S. Soil Conservation Service), Oregon State University Extension Service, the Oregon Department of Transportation (ODOT), BLM, U.S. Forest Service (USFS), local soil conservation districts, and private sector experts.
- Establishment of a self-sustaining ecosystem, comparable to undamaged ecosystems in the area of the mine.
- Revegetation shall be considered successful if it is consistent with the establishment of a self-sustaining ecosystem, comparable to undamaged ecosystems in the area of the mine. Vegetation test plots and chemical/physical soil and subsoil analysis may be required to ensure establishment feasibility.

3.2 Oregon Biodiversity Information Center

The Oregon Biodiversity Information Center (OBDIC) maintains a computerized inventory of the wildlife, plant, and ecological community resources of Oregon. As part of the Natural Heritage Network and NatureServe, OBDIC contributes to a better understanding of global biodiversity and provides tools for managers and the public to better protect plant and animal species and communities.

The Oregon Natural Heritage Program (ORNHP) works to establish natural areas in Oregon and manages the Oregon Natural Heritage Databank, which contains comprehensive information on ecologically and scientifically significant natural areas in the state. ORNHP's mission statement is "to acquire, maintain and distribute information on the organisms and ecosystems that constitute Oregon's natural heritage, and to ensure, through a public planning process and through voluntary public and private efforts, that the full range of Oregon's natural heritage resources is represented within a statewide system of recognized natural areas."

The Oregon Natural Heritage Act (ORS 273.563-273.591) provides the following:

- A natural heritage data management system for Oregon, with an office to manage the system and the other parts of the act;
- A Natural Heritage Advisory Council, with nine citizens appointed by the governor, and a representative from each of the state's natural resources agencies;
- An ORNHP, outlining strategies for protecting examples of Oregon's natural heritage and the natural heritage program;
- An Oregon register of natural heritage areas, a voluntary program which recognizes important natural areas in Oregon; and
- A system of dedicated and protected natural areas, including state natural heritage conservation areas, private reserves, and federal research natural areas.

3.3 U.S. Fish and Wildlife Service Threatened, Endangered and Sensitive Species

USFWS is responsible for administering and implementing the Endangered Species Act (ESA) to conserve, protect, and recover federally-listed species. One plant species is protected under the ESA for Malheur County, Oregon. USFWS listed Howell's spectacular thelypody (*Thelypodium howellii spectabilis*) as a federally-threatened species on May 26, 1999. Habitat for this species is found in moist alkaline meadow habitats, typically adjacent to streams that experience springtime flooding (USFWS 2013).

3.4 Bureau of Land Management Special Status Species (BLM Manual, Section 6840)

Management of Oregon BLM special status species follows agency policy documented in Section 6840 of the BLM manual. Section 6840 defines sensitive species as follows:

> *"... [T]hose species not already included as BLM special status species under (1) federal listed, proposed, or candidate species, or (2) State of Oregon listed species. Native species may be listed as 'sensitive' if one of the following applies: (1) could become endangered or extirpated from a state or significant portion of its range; (2) is under review by the USFWS; (3) numbers or habitat capability are declining so rapidly that federal listing may become necessary; (4) has typically small and widely dispersed populations; (5) inhabits ecological refugia, specialized, or unique habitats; or (6) is state-listed; although, is better conserved through application of the BLM sensitive species status."*

It is BLM policy to provide sensitive species with the same level of protection given to federal candidate species. The major objective of this protection is to preclude the need for federal listing. The federal land management plans and the BLM resource management plans provide management direction for the many multiple uses, including outdoor recreation, range, timber, watershed, fish and wildlife, minerals, wilderness, roadless areas, and cultural resources. These plans were amended by the *Northwest Forest Plan* on the west side of the state and the *Interior Columbia Basin Strategy* on the east side of the state. The Interior Columbia Basin Ecosystem Management Project developed a framework for ecosystem management and a scientific assessment of the ecological, biophysical, social, and economic conditions of the Columbia basin, including all of eastern Oregon. Instead of a formal, basin-wide decision from the project, federal decision makers adopted a strategy of incorporating the science into ongoing BLM land management plans.

A total of 139 plant species are considered special status for the BLM's Vale District.

3.5 Oregon Endangered Species Act

ODA states the following:

> *Native plants that are listed as threatened or endangered in Oregon are protected on all non-federal public lands (state, county, city, etc.) under the Oregon Revised Statute (ORS) 564, commonly known as the Oregon Endangered Species Act. The Oregon Department of Agriculture is given the responsibility for conservation of native plants under the Oregon Administrative Rules (OAR) 603-073-0001. These rules outline the list of activities that require a listed plant permit in Oregon.*

There are no non-federal public lands within the terrestrial vegetation study area; therefore, the Oregon Endangered Species Act does not apply to this project.

3.6 Literature Review

Before beginning vegetation field studies, the HDR team reviewed existing information from past studies and reports for relevant information pertaining to terrestrial vegetation within the project study area.

HDR reviewed the following existing reports:

- BLM, Vale District Office. 1983. *Draft Report, Southern Malheur Grazing Management Program. Environmental Impact Statement*.

- BLM. 2001. *Environmental Impact Statement and Related Appendices (Vegetation and Grazing)*.
- Cedar Creek Associates Inc. 1991. *Vegetation Technical Memorandum*.
- HDR. 2012. *Terrestrial Vegetation Report, Grassy Mountain Project*.
- IMS, Inc. 1989. *Final Report: Soil, Vegetation, and Wildlife Resources of the Grassy Mountain Project Area*.
- Wright, Caroline E. 1991. *Grassy Mountain Project Botanical Survey.*
- Wright, Caroline E. 1989. *Preliminary Grassy Mountain Botanical Report*.

HDR reviewed these additional key references:

- Adrian Brown Consultants, Inc. 1992. *Draft Grassy Mountain Environmental Impact Statement*.
- BLM. 1999. *Overview of BLM's NEPA Process*.
- BLM, Vale District Office. April 2001. *Proposed Southeastern Oregon, Resource Management Plan and Final Environmental Statement*. http://www.blm.gov/or/districts/vale/plans/files/seormp/SEORMP-FEIS-Vol1Txt.pdf
- BLM. 2008. *NEPA Handbook*, H-1790-1.
- BLM. 2008. Manual Section, "6840 – Special Status Species."
- Consolidated State Agency Response. 1993. *Consolidated State Agency Response to Newmont Grassy Mountain Corporations Environmental Baseline Proposed Work Plan*.
- Grassy Mountain Oregon Department of Geology and Mineral Industries (DOGAMI) Technical Review Team (TRT). 2012. *Suggested Baseline Data Methodologies Submittal – Oregon Chemical Processing Mining*.
- Newmont Grassy Mountain Corporation (NMC). 1993. *Vegetation Baseline Study for Newmont Grassy Mountain Mine Project*.
- Oregon Natural Heritage Database. 1989. *Rare, Threatened and Endangered Plants and Animals of Oregon*.
- Pacific Northwest Interagency. 2013. *Final Oregon / Washington State Director Special Status Species List*.

To address potential direct and residual environmental impacts and to form the basis for reclamation planning at the Grassy Mountain site, HDR also reviewed the following prior to beginning field surveys:

- TRT-approved *Grassy Mountain Terrestrial Vegetation Work Plan*.
- Existing reports, mapping and other materials relative to the site, which address terrestrial vegetation resources. These included reports prepared by NMC and Atlas Precious Metals (Atlas), their contractors, ODFW, USFWS, BLM, Malheur County Weed Control Board, and other related documents.

3.7 Field Studies

During preliminary field studies conducted during the summer of 2012, HDR identified three vegetation community types within the study area: sagebrush/bunchgrass, crested wheatgrass/annual grass, and annual grass. HDR's activities included the following:

- Inventoried eight 10-foot-wide by 10-foot-long vegetation transects to determine primary vegetation composition within three vegetation communities for the mine site, transportation access corridor, and the processing plant location.
- Located the eight transects with a global positioning system (GPS) unit.
- Documented the plants by common name, scientific name and the quantity of each species within each transect. Plants inventoried include shrubs, forbs and grasses.
- Identified and documented dominant and co-dominant species.
- Described the ground slope associated with each transect.
- Photo-documented the eight transect sites.

During the early spring of 2013, prior to grazing, HDR used the Daubenmire method for sampling vegetation attributes within each vegetation community to survey an additional transect. This method consists of systematically placing a 20-centimeter by 50-centimeter quadrant frame along a 100-foot measuring tape and determining vegetation characteristics of canopy cover, frequency, and composition by canopy cover. HDR recorded the information collected in the field on standardized Daubenmire field forms, which are included in **Appendix B**.

HDR also conducted a search for any federally-listed TES plant species and sensitive plant species for BLM and State of Oregon. Much of the project study area is located adjacent to BLM land. The list of sensitive plant species for the State of Oregon is included in **Appendix C**.

HDR obtained a list of noxious weeds for Malheur County, Oregon, from the Malheur County Weed Advisory Board website. The list is included in **Appendix D**. Malheur County has prioritized control and/or eradication of noxious weeds by A, B, and C classes, with category A having the highest priority. Noxious weeds that HDR observed on site are described in the baseline characterization section of this report. This inventory will be the basis for Calico developing a noxious weeds control strategy and plan, which are key components of the overall plan of operations (POO) to be submitted as part of the Division 37 process.

Section 4: Baseline Characterization

4.1 Plant Community Description

Vegetation within the study area is a desert-rangeland type where sagebrush and grasses are the dominant species. The area has been extensively grazed for a number of years. Portions of the study area appear to have been re-seeded at one time with a crested wheatgrass (*Agropyron cristatum*) dominated seed mix.

Figure 4-1 shows the three vegetation community types identified within the study area: sagebrush/bunchgrass, crested wheatgrass/annual grass, and annual grass. Cheatgrass and/or medusahead were often the most dominant species in nearly every plant community.

The sagebrush/bunchgrass plant community type is characteristic of the native sagebrush community found throughout much of Eastern Oregon. This plant community typically occurs on rocky slopes. Bare ground in these areas often ranges from 25 to 50 percent. The shrub stratum is typically dominated by big sagebrush (Artemisia tridentata), rubber rabbitbrush (*Chrysothamnus nauseosus*) and green rabbitbrush (*Chrysothamnus viscidiflorus*). The understory typically includes Sandberg's bluegrass (*Poa secunda*), Idaho fescue (*Festuca idahoensis*), and bluebunch wheatgrass (*Agropyron spicatum*) with a cheatgrass and/or medusahead mat. **Photo 4-1** shows typical characteristics of the sagebrush/bunchgrass plant community.

Photo 4-1. Typical sagebrush/bunchgrass plant community.

The crested wheatgrass/annual grass plant community occurs throughout portions of the study area. Soil in these areas is typically less rocky with 25- to 50-percent bare ground. The crested wheatgrass is likely a result of past seedings. Grazing is common in these areas and a cheatgrass and/or medusahead mat is prevalent throughout. **Photo 4-2** shows typical characteristics of the crested wheatgrass/annual grass community.

Photo 4-2. Typical crested wheatgrass/annual grass community.

Some of the study area is dominated by an annual grass plant community. Slopes in these areas are gentle and invasive species such as cheatgrass and medusahead are abundant.

4.2 Vegetation Transects

4.2.1 Transect 1

HDR established one 10-foot-wide by 10-foot-long transect at 117.355E, 43.669N, located in Section 8, Township 22 South, Range 44 East (**Figure 4-1**). Transect 1 is located on an east-facing aspect with slopes ranging from 5 to 8 percent. Approximately 70 to 75 percent of the slope is vegetated. The shrub stratum consists of rubber rabbitbrush with an understory co-dominated by cheatgrass and medusahead. Bunchgrasses are present in the herbaceous stratum. Information for Transect 1 is presented in **Table 4-1**. **Photo 4-3** and **Photo 4-4** show the characteristic vegetative cover in the area of Transect 1.

Table 4-1. Transect #1 Sagebrush/Bunchgrass Community

Coordinates; 117.355E, 43.669N		**Investigators:** Waldher, Modlin **Date:** June 18, 2012
Common Name	**Scientific Name**	**Quantity**
Shrubs		
rubber rabbitbrush	*Chrysothamnus nauseosus*	9
Forbs		
large-flowered goldenweed	*Happlopappus carthamoides*	2
Grasses		
bluebunch wheatgrass	*Agropyron spicatum*	7
cheatgrass	*Bromus tectorum*	Co-dominant herbaceous species
Sandberg's bluegrass	*Poa secunda*	2
medusahead	*Taeniatherum caput-medusae*	Co-dominant herbaceous species

Photo 4-3. Transect 1 occurs in a sagebrush/ bunchgrass plant community.

Photo 4-4. Vegetation ranges from 6- to 30-inch height with 25 to 30 percent bare ground.

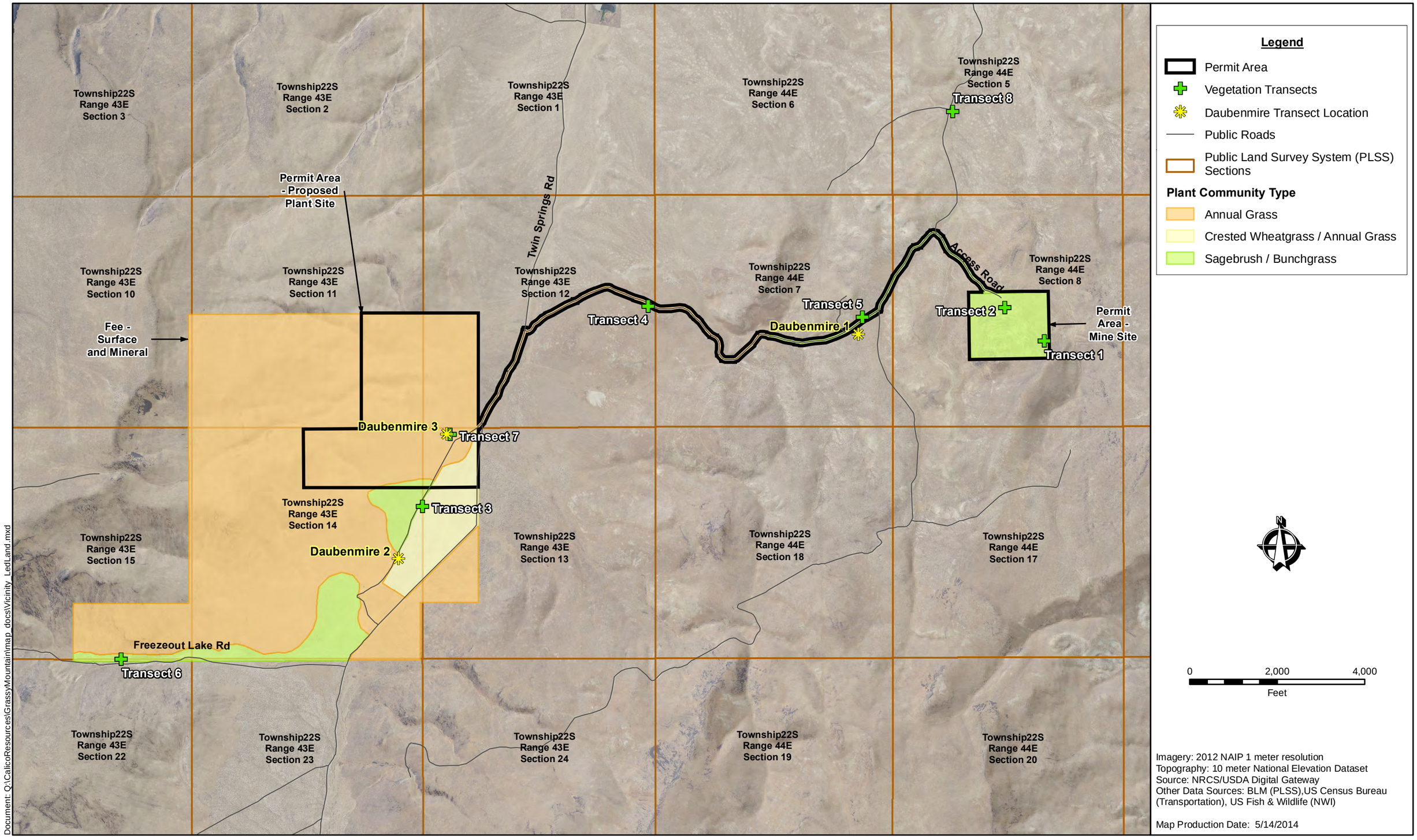


Figure 4-1. Vegetation Community Types
Calico Resources, Grassy Mountain Project
Malheur County, OR

4.2.2 Transect 2

HDR established one 10-foot-wide by 10-foot-long transect at 117.359E, 43.671N, located in Section 8, Township 22 South, Range 44 East (**Figure 4-1**). Transect 2 is located on a north-facing aspect with slopes ranging from 3 to 5 percent. Approximately 45 to 50 percent of the slope is vegetated. The shrub stratum consists of big sagebrush, green rabbitbrush, and greasewood (*Sarcobatus vermiculatus*) with an understory co-dominated by cheatgrass and medusahead. Bunchgrasses are present in the herbaceous stratum. Information for Transect 2 is presented in **Table 4-2**.
Photo 4-5 and **Photo 4-6** show the characteristic vegetative cover in the area of Transect 2.

Table 4-2. Transect #2 Sagebrush/ Bunchgrass Community

Coordinates: 117.359E, 43.671N		**Investigators:** Waldher, Modlin **Date:** June 18, 2012
Common Name	**Scientific Name**	**Quantity**
Shrubs		
big sagebrush	*Artemisia tridentata*	5
green rabbitbrush	*Chrysothamnus viscidiflorus*	1
greasewood	*Sarcobatus vermiculatus*	1
Grasses		
bluebunch wheatgrass	*Agropyron spicatum*	8
cheatgrass	*Bromus tectorum*	Co-dominant herbaceous species
Sandberg's bluegrass	*Poa secunda*	2
medusahead	*Taeniatherum caput-medusae*	Co-dominant herbaceous species

Photo 4-5. Transect 2 occurs in a sagebrush/ bunchgrass plant community.

Photo 4-6. Vegetation ranges from 6- to 42-inch height with 50 to 55 percent bare ground.

4.2.3 Transect 3

HDR established one 10-foot-wide by 10-foot-long transect at 117.409E, 43.659N, located in Section 13, Township 22 South, Range 43 East (**Figure 4-1**). Transect 3 is located in a valley bottom with slopes ranging from 1 to 2 percent. Approximately 55 to 60 percent of the area is vegetated. The area appears to be re-seeded with a crested wheatgrass seed mix, but cheagrass and medusahead have invaded throughout. Information for Transect 3 is presented in **Table 4-3**. **Photo 4-7** and **Photo 4-8** show the characteristic vegetative cover in the area of Transect 2.

Table 4-3. Transect #3 Crested Wheatgrass/Annual Grass Community

Coordinates: 117.409E, 43.659N		**Investigators:** Waldher, Modlin **Date:** June 18, 2012
Common Name	**Scientific Name**	**Quantity**
Forbs		
buckwheat	*Erigonum sp.*	1
mustard	*Sisymbrium sp.*	3
Grasses		
crested wheatgrass	*Agropyron cristatum*	29
cheatgrass	*Bromus tectorum*	Co-dominant herbaceous species
Sandberg's bluegrass	*Poa secunda*	17
medusahead	*Taeniatherum caput-medusae*	Co-dominant herbaceous species

Photo 4-7. Transect 3 occurs in a crested wheatgrass/annual grass plant community.

Photo 4-8. Vegetation ranges from 3- to 24-inch height with 50 to 55 percent bare ground.

4.2.4 Transect 4

HDR established one 10-foot-wide by 10-foot-long transect at 117.995E, 43.671N, located in Section 12, Township 22 South, Range 43 East (**Figure 4-1**). Transect 4 is located on a west-facing aspect, with slopes ranging from 3 to 5 percent. Approximately 85 percent of the slope is vegetated. Dominant vegetation within the transect consists of invasive annual grasses such as cheatgrass and medusa head. A small population of Austrian peaweed (*Sphaerophysa salusula*), a noxious weed species, occurs at this location. Information for Transect 4 is presented in **Table 4-4**. **Photo 4-9** and **Photo 4-10** show the characteristic vegetative cover in the area of Transect 4.

Table 4-4. Transect #4 Annual Grass Community

Coordinates: 117.995E, 43.671N		**Investigators:** Waldher, Modlin **Date:** June 18, 2012
Common Name	**Scientific Name**	**Quantity**
Forbs		
pepperweed	*Lepidium perfoliatum*	2
tumble mustard	*Sisymbrium altissimum*	2
Austrian peaweed	*Sphaerophysa salusula*	3
moth mullein	*Verbascum blattaria*	6
Grasses		
crested wheatgrass	*Agropyron cristatum*	6
cheatgrass	*Bromus tectorum*	Co-dominant herbaceous species
Idaho fescue	*Festuca idahoensis*	86
medusahead	*Taeniatherum caput-medusae*	Co-dominant herbaceous species
small fescue	*Vulpia mierostaehys*	3

Photo 4-9. Transect 4 occurs in an annual grass plant community.

Photo 4-10. Vegetation ranges from 4- to 30-inch height with 10 to 15 percent bare ground.

4.2.5 Transect 5

HDR established one 10-foot-wide by 10-foot-long transect at 117.371E, 43.671N, located in Section 7, Township 22 South, Range 44 East (**Figure 4-1**). Transect 5 is located on a south-facing aspect with slopes ranging from 0 to 2 percent. Approximately 65 to 70 percent of the slope is vegetated. The shrub stratum consists of big sagebrush with an understory of Idaho fescue (*Festuca idahoensis*) and cheatgrass. Information for Transect 5 is presented in **Table 4-5**. **Photo 4-11** and **Photo 4-12** show the characteristic vegetative cover in the area of Transect 5.

Table 4-5. Transect #5 Sagebrush/Bunchgrass Community

Coordinates: 117.371E, 43.671N		**Investigators:** Waldher, Modlin **Date:** June 18, 2012
Common Name	**Scientific Name**	**Quantity**
Shrubs		
big sagebrush	*Artemisia tridentata*	13
Grasses		
bluebunch wheatgrass	*Agropyron spicatum*	1
cheatgrass	*Bromus tectorum*	Dominant herbaceous species
Idaho fescue	*Festuca idahoensis*	66
Sandberg's bluegrass	*Poa secunda*	3

Photo 4-11. Transect 5 occurs in a sagebrush/ bunchgrass plant community.

Photo 4-12. Vegetation ranges from 4- to 42-inch height with 30 to 35 percent bare ground.

4.2.6 Transect 6

HDR established one 10-foot-wide by 10-foot-long transect at 117.435E, 43.649N, located in Section 22, Township 22 South, Range 43 East (**Figure 4-1**). Transect 6 is located on a rocky, north-facing aspect with slopes ranging from 2 to 5 percent. Approximately 40 percent of the slope is vegetated. The shrub stratum consists of big sagebrush and green rabbitbrush with an understory of cheatgrass and various bunchgrasses that are un-identifiable because of heavy grazing. Information for Transect 6 is presented in **Table 4-6**. **Photo 4-13** and **Photo 4-14** show the characteristic vegetative cover in the area of Transect 6.

Table 4-6. Transect #6 Sagebrush/Bunchgrass Community

Coordinates: 117.435E, 43.649N		**Investigators:** Waldher, Modlin **Date:** June 19, 2012
Common Name	**Scientific Name**	**Quantity**
Shrubs		
big sagebrush	*Artemisia tridentata*	5
green rabbitbrush	*Chrysothamnus viscidiflorus*	1
Grasses		
cheatgrass	*Bromus tectorum*	Dominant herbaceous species
misc. bunchgrass	*Misc. sp.*	Grasses Heavily Grazed (Unable to identify)

Photo 4-13. Transect 6 occurs in a sagebrush/ bunchgrass plant community.

Photo 4-14. Vegetation ranges from 4- to 42-inch height with 60 percent bare ground.

4.2.7 Transect 7

HDR established one 10-foot-wide by 10-foot-long transect at 117.407E, 43.663N, located in Section 13, Township 22 South, Range 43 East (**Figure 4-1**). Transect 7 is located on an east-facing aspect with slopes ranging from 2 to 3 percent. Approximately 90 percent of the slope is vegetated by a cheatgrass/medusahead mat. Evidence of grazing is present throughout the area. Information for Transect 7 is presented in **Table 4-7**. **Photo 4-15** and **Photo 4-16** show the characteristic vegetative cover in the area of Transect 7.

Table 4-7. Transect #7 Annual Grass Community

Coordinates: 117.407E, 43.663N		**Investigators:** Waldher, Modlin **Date:** June 19, 2012
Common Name	**Scientific Name**	**Quantity**
Forbs		
blue mustard	*Chorispora tenalla*	1
prickly lettuce	*Lactuca serriola*	1
tumble mustard	*Sisymbrium altissimum*	9
Grasses		
cheatgrass	*Bromus tectorum*	dominant herbaceous species

Photo 4-15. Transect 7 occurs in an annual grass plant community.

Photo 4-16. Vegetation ranges from 4- to 12-inch height with 10 percent bare ground.

4.2.8 Transect 8

HDR established one 10-foot-wide by 10-foot-long transect at 117.363E, 43.684N, located in Section 5, Township 22 South, Range 44 East (**Figure 4-1**). Transect 8 is located in a valley bottom with slopes ranging from 0 to 2 percent. Approximately 30 to 35 percent of the area is vegetated. The shrub stratum consists of big sagebrush and green rabbitbrush with an understory dominated by Sandberg's bluegrass. Evidence of heavy grazing is present in the area. Information for Transect 8 is presented in **Table 4-8**. **Photo 4-17** and **Photo 4-18** show the characteristic vegetative cover in the area of Transect 8.

Table 4-8. Transect #8 Sagebrush/Bunchgrass Community

Coordinates: 117.363E, 43.684N		**Investigators:** Waldher, Modlin **Date:** June 19, 2012
Common Name	**Scientific Name**	**Quantity**
Shrubs		
big sagebrush	*Artemisia tridentata*	3
green rabbitbrush	*Chrysothamnus viscidiflorus*	2
Grasses		
crested wheatgrass	*Agropyron cristatum*	4
cheatgrass	*Bromus tectorum*	17
Sandberg's bluegrass	*Poa secunda*	112

Photo 4-17. Transect 8 occurs in a sagebrush/ bunchgrass plant community.

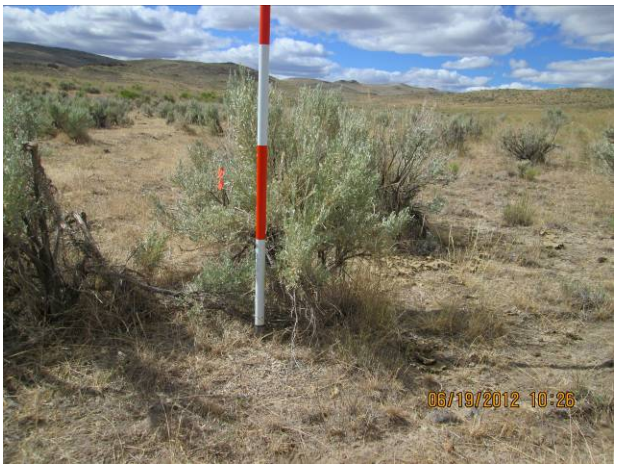


Photo 4-18. Vegetation ranges from 4- to 30-inch height with 65 to 70 percent bare ground.

4.4 Daubenmire Sampling Results

4.4.1 Daubenmire #1 – Sagebrush/Bunchgrass Community

HDR performed a Daubenmire vegetation survey at 117.372E, 43.669N, located in Section 7, Township 22 South, Range 44 East (**Figure 4-1**). The sampling plot is located approximately 30 feet south of the proposed access road within the sagebrush/bunchgrass vegetation community. Information for Daubenmire #1 is presented in **Table 4-9**. Daubenmire survey results at this location show that bluebunch wheatgrass had the highest percentage of canopy cover and the highest composition at this location. Cheatgrass has the highest frequency of occurrence within the 50 surveyed quadrats. **Photo 4-19** and **Photo 4-20** show the Daubenmire survey completed at this location and the completed survey form is included in **Appendix B**.

Table 4-9. Daubenmire #1 Sagebrush/Bunchgrass Community

Coordinates: 117.372E, 43.670N 30 feet south of proposed access road		**Investigator:** Waldher **Date:** May 7, 2013	
Plant Species	**Percent Canopy Cover**	**Species Composition**	**Frequency**
ARTR – Artemisia tridentata	8	23	34
CHVI – Chrysothamnus nauseosus	-	-	4
POSE – Posa secunda	6	17	48
AGSP – Agropyron spicatum	10	29	42
ERSP – Erigonum spergulinum	3	9	26
PHLOX – Phlox sp.	1	3	38
BRTE – Bromus tectorum	7	20	70

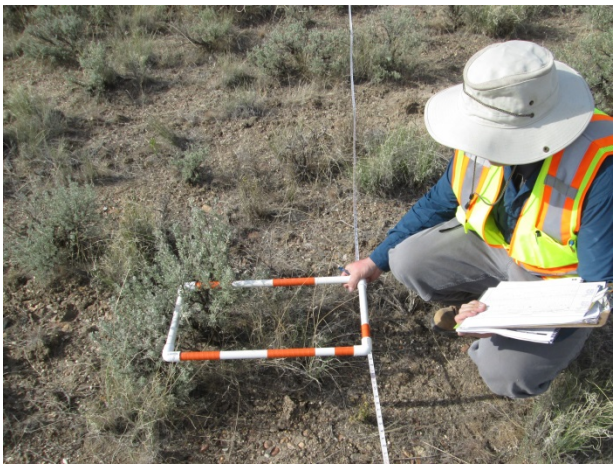


Photo 4-19. Using the Daubenmire frame placed along a 100-foot-long measuring tape, HDR measured 50 quadrats.

Photo 4-20. Daubenmire #1 was located approximately 30 feet from the proposed access road within the sagebrush/bunchgrass plant community.

4.4.2 Daubenmire #2 – Crested Wheatgrass Community

HDR performed a Daubenmire vegetation survey at 117.411E, 43.656N, located in Section 13, Township 22 South, Range 43 East (**Figure 4-1**). The sampling plot is located approximately 100 yards west of Twin Springs Road within the crested wheatgrass vegetation community. Information for Daubenmire #2 is presented in **Table 4-10**. Daubenmire survey results at this location show that crested wheatgrass has the highest percentage of canopy cover and the highest composition at this location. Cheatgrass has the highest frequency of occurrence within the 50 surveyed quadrats. **Photo 4-21** and **Photo 4-22** show the Daubenmire survey that completed at this location and the completed survey form is included in **Appendix B**.

Table 4-10. Daubenmire #1 Crested Wheatgrass Community

Coordinates: 117.411E, 43.656N 100 yards west of Twin Springs Road		**Investigator:** Waldher **Date:** May 7, 2013	
Plant Species	**Percent Canopy Cover**	**Species Composition**	**Frequency**
AGCR – Agrpyron spicatum	17	71	6
BRTE – Bromus tectorum	1	4	25
POSE – Posa secunda	6	28	56

Photo 4-21. Clumps of crested wheatgrass are visible within sampling area.

Photo 4-22. Daubenmire #2 was located approximately 100 yards from Twin Springs Road within the crested wheatgrass plant community.

4.4.3 Daubenmire #3 – Annual Grass Community

HDR performed a Daubenmire vegetation survey at 117.407E, 43.664N, located in Section 14, Township 22 South, Range 43 East (**Figure 4-1**). The sampling plot is located approximately 200 feet west of Twin Springs Road, within the annual grass vegetation community. Information for Daubenmire #3 is presented in **Table 4-11**. Daubenmire survey results at this location show that cheatgrass has the highest percentage of canopy cover, highest composition, and the highest frequency of occurrence within the 50 surveyed quadrats. **Photo 4-23** and **Photo 4-24** show the Daubenmire survey completed at this location and the completed survey form is included in **Appendix B**.

Table 4-11. Daubenmire #3 Annual Grass Community

Coordinates: 117.407E, 43.664N 200 feet west of Twin Springs Road		**Investigator:** Waldher **Date:** May 7, 2013	
Plant Species	**Percent Canopy Cover**	**Species Composition**	**Frequency**
BRTE – Bromus tectorum	53	90	96
POSE – Posa secunda	3	5	38
AGCR – Agrpyron spicatum	-	-	8
LASE – Lactuca serriola	2	3	26
ELCA – Elymus caput-medusae	1	2	50

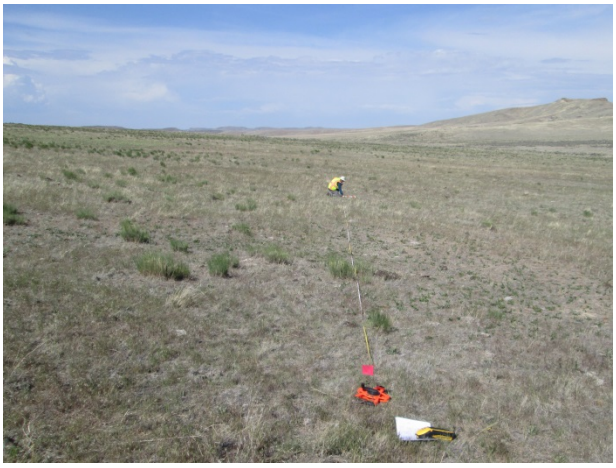


Photo 4-23. Sampling in the annual grass plant community.

Photo 4-24. Daubenmire #3 was located approximately 200 feet west of Twin Springs Road within the annual grass plant community.

4.5 Additional Vegetation Survey Results

4.5.1 Threatened and Endangered Species (federal)

HDR obtained the federally-listed plant species for Malheur County, Oregon, from USFWS. Howell's spectacular thelypody (*Thelypodium howellii ssp. spectabilis*) is listed as a threatened species for Malheur County. Howell's spectacular thelypody is a herbaceous biennial that occurs in mesic, alkaline habitats in the Baker-Powder River Valley region in northeast Oregon. It formerly also occurred in the Willow Creek Valley in Malheur County. Suitable habitat for this species may exist near the study area. However, HDR did not observe the species during the vegetation surveys.

4.5.2 Sensitive Species (state)

Much of the study area is located adjacent to BLM land. HDR obtained a list of sensitive plant species for the State of Oregon (**Appendix C**). HDR did not observe any of the plant species listed in **Appendix C** within the study area.

4.5.3 Noxious weed species

HDR obtained a list of noxious weeds for Malheur County Oregon (**Appendix C**) from the Malheur County Weed Advisory Board. Malheur County has prioritized control and/or eradication of noxious weeds by A" B, and C classes, with Class A having the highest priority. HDR observed the following noxious weeds during field investigations:

- One small, isolated population of Class A weed species, Austrian peaweed (*Sphaerophysa salusula*), adjacent to the proposed access road. This species is subject to mandatory control/eradication where found.
- One Class B species, Canada thistle (*Cirsium arvense*), just ouside of the study area near the northern boundary of the mine permit area. All Class B weeds are required to be controlled within 50 feet of all property lines, easements, and rights of way.
- Three Class C species within the study area: cheatgrass, medusahead and field bindweed (*Convoculus arvensis*). These species can be treated at the landowner's discretion. Cheatgrass and medusahead are the most dominant grass species throughout all of the study area.

Section 5: Description of Competing Land Uses

The primary adjacent land use to the proposed project has been and continues to be cattle grazing. Evidence of heavy grazing was present throughout much of the study area during the 2012 and 2013 vegetation field surveys. As the mine site and processing facilities are developed, these areas would be fenced off from grazing. It is likely that grazing would continue to occur on land adjacent to the permitted area.

Section 6: Revegetation and Reclamation Considerations and Opportunities

Calico will revegetate and reclaim disturbed sites during and after mining activities. Qualified personnel will analyze the pre-disturbance soil characteristics and determine the amount of soil that should be stockpiled for revegetation and reclamation. Disturbed areas will be seeded with a native seed mixture that is approved by BLM and other state agencies. A preliminary reclamation seed mixture is presented in **Table 6-1**. The reclamation goal will be to establish a self-sustaining ecosystem, comparable to undamaged ecosystems in the area of the mine. Vegetation test plots and chemical/physical soil and subsoil analysis may be required to ensure establishment feasibility.

Table 6-1. Preliminary Reclamation Seed Mixture

Botanical Name	Common Name	PLS Per Acre	# of Seeds Per LB	# of Seeds in Mix	% of Mix
Shrubs					
Artemisia tridentata vaserana	Mountain big sagebrush	0.25	2,500,000	625,000	0.69
Chrysothamnus nauseosus	Rubber rabbitbrush	0.50	400,000	200,000	1.4
Grasses					
Bouteloua curtipendula	Vaughn sideoats gramma	6.0	191,000	1,146,000	16.4
Elymus lanceolatus 'Sodar'	Sodar streambank wheatgrass	10	156,000	1,560,000	27.4
Elymus trachycaulus 'Revenue'	Revenue slender wheatgrass	2.5	159,000	390,000	6.8
Festuca ovina 'Covar'	Covar sheep fescue	3.0	680,000	2,040,000	8.2
Koeleria macrantha	Prairie junegrass	0.25	2,315,400	578,850	0.69
Panicum virgatum 'Pathfinder'	Pathfinder switchgrass	3.0	389,900	1,169,700	8.2
Pascopyrum smithii	Western wheatgrass	4.0	110,000	440,000	11.0
Poa sandbergii	Sandberg bluegrass	1.0	925,000	925,000	2.7
Pseudorecneura spicata	Bluebunch wheatgrass	4.0	389,000	1,556,000	11.0
Schizachyrium scoparium 'Pastura'	Pastura little bluestem	2.0	260,000	520,000	5.5
Total Application Rate (LBS/Acre)		**36.5**			

Section 7: Bibliography

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A

Appendix A.

Vegetation Species Observed

Appendix A Grassy Mountain Exploration Project Terrestrial Vegetation Report – Vegetation Species Observed			
Scientific Name	**Common Name**	**Family Name**	**Plant Description**
Shrubs (Shrub Stratum)			
Artemisia tridentata	big sagebrush	Asteraceae	Perennial shrub
Chrysothamnus nauseosus	rubber rabbitbrush	Asteraceae	Perennial shrub
Chrysothamnus viscidiflorus	green rabbitbrush	Asteraceae	Perennial shrub
Opuntia polyacantha	plains prickly pear	Cactaceae	Perennial shrub
Rosa woodsii	Wood's rose	Rosaceae	Perennial shrub
Sarcobatus vermiculatus	greasewood	Chenopodiaceae	Perennial shrub
Forbs (Herbaceous Stratum)			
Achillea millefolium	common yarrow	Asteraceae	Perennial forb
Arnica sp.	arnica	Asteraceae	Perennial forb
Balsamorhiza sagittata	arrowleaf balsamroot	Asteraceae	Perennial forb
Chorispora tenella	blue mustard	Brassicaceae	Annual forb
Cirsium arvense	Canada thistle	Asteraceae	Noxious weed
Cirsium undulatum	wavyleaf thistle	Asteraceae	Perennial forb
Convolvulus arvensis	field bindweed	Convolvulaceae	Perennial forb
Eriogonum spergulinum	buckwheat	Polygonaceae	Annual forb
Haplopappus carthamoides	large-flowered goldenweed	Asteraceae	Perennial forb
Kochia scoparia	kochia	Chenopodiaceae	Annual forb
Lepidium perfoliatum	pepperweed	Brassicaceae	Annual/biennial forb
Melilotus alba	white sweet clover	Leguminaceae	Perennial forb
Melilotus officinalis	yellow sweet clover	Leguminaceae	Perennial forb
Phlox sp.	phlox	Polemoniaceae	Perennial forb
Rumex crispus	curly dock	Polygonaceae	Perennial forb
Sisymbrium altissimum	tumble mustard	Brassicaceae	Annual/biennial forb
Sphaeralcea munroana	Munro's gobemallow	Malvaceae	Perennial forb
Sphaerophysa salusula	Austrian peaweed	Fabaceae	Noxious weed
Taraxacum officinale	common dandelion	Compositaceae	Perennial forb
Tragopogon dubius	salsify	Asteraceae	Annual/biennial forb
Verbascum blattaria	moth mullein	Scrophulariaceae	Biennial forb
Grass and Grasslikes (Herbaceous Stratum)			
Agropyron cristatum	crested wheatgrass	Poaceae	Perennial grass
Agropyron spicatum	bluebunch wheatgrass	Poaceae	Perennial grass
Bromus tectorum	cheat grass	Poaceae	Annual grass
Eleocharis sp.	spikerush	Cyperaceae	Native grasslike
Elymus caput-medusae	medusahead	Poaceae	Annual grass
Elymus elymoides	squirreltail	Poaceae	Perennial grass
Hordeum jubatum	foxtail barley	Poaceae	Perennial grass
Juncus sp.	rush species	Juncaceae	Native grasslike
Leymus cinereus	Great Basin wildrye	Poaceae	Perennial grass
Poa secunda	Sandberg's bluegrass	Poaceae	Perennial grass
Polypogon monspeliensis	rabbit's foot grass	Poaceae	Annual grass
Vulpia microstachys	small fescue	Poaceae	Annual grass

B

Appendix B.

Vegetation Field Sampling Forms

Calico Resources Grassy Mountain Project
Vegetation Survey *Reporting Form*

Project: Calico Resources – Grassy Mountain Exploration Project	**Transect Name/#: 1**

Field Surveyor(s): 1. Bob Waldher 2. Matt Modlin	Date: 06-18-12 Time: 10:00 AM Weather: Partly Cloudy
Location Description: East side of mine permit area.	GPS Coordinates N: 43.669 E: -117.355
Vegetation Class: (i.e., sagebrush/grassland: grassland) Sagebrush / Bunchgrass	
Plot Size: 10' x 10'	
Section, Township, Range: 8, 22S, 44E	Datum: NAD 83
Land Ownership (BLM, private): Patented Claim	Accuracy: +/- 1 Meter

Est. % bare ground: 25%	Aspect: East Facing
Slope: 5% - 8%	Vegetation Height: 6" – 30"
Disturbance (grazing, roads, etc.): Grazed, access roads located nearby.	

Common Name	Botanical Name	Quantity
rubber rabbitbrush	*Chrysothamnus nauseosus*	9
large-flowered goldenweed	*Happlopappus carthamoides*	2
bluebunch wheatgrass	*Agropyron spicatum*	7
cheatgrass	*Bromus tectorum*	Dom.
Sandberg's bluegrass	*Poa secunda*	2
medusahead	*Taeniatherum caput-medusae*	Dom.

Calico Resources Grassy Mountain Project
Vegetation Survey *Reporting Form*

TES Species Observed (circle one)**:** **YES** **(NO)**

☐ USFWS
☐ BLM
☐ State of Oregon

Common Name	Botanical Name	Quantity

Population Notes: No special status species observed.

Noxious Weeds/Invasive Species Observed (circle one)**:** **(YES)** **NO**

☐ Class A
☐ Class B
☒ Class C

Common Name	Botanical Name	Quantity
cheatgrass	*Bromus tectorum*	Dom.
medusahead	*Taeniatherum caput-medusae*	Dom.

Population Notes: Cheatgrass and medusahead are co-dominant weed species present within the transect.

Additional Vegetation Survey Notes: Cheatgrass and medusahead form a mat of cover. Not able to count individual plants.

Site Photographs (include photo #, brief description and direction)**:**

Photos 9-19, Camera D, overview of plant community and transect sampling location.

Calico Resources Grassy Mountain Project
Vegetation Survey *Reporting Form*

Project: Calico Resources – Grassy Mountain Exploration Project	**Transect Name/#: 2**

Field Surveyor(s): 3. Bob Waldher 4. Matt Modlin	Date: 06-18-12 Time: 11:05 AM Weather: Partly Cloudy
Location Description: North side of mine permit area.	GPS Coordinates N: 43.671 E: -117.359
Vegetation Class: (i.e., sagebrush/grassland: grassland) Sagebrush / Bunchgrass	
Plot Size: 10' x 10'	
Section, Township, Range: 8, 22S, 44E	Datum: NAD 83
Land Ownership (BLM, private): Patented Claim	Accuracy: +/- 1 Meter

Est. % bare ground: 50% - 55%	Aspect: North Facing
Slope: 3% - 5%	Vegetation Height: 6" – 42"
Disturbance (grazing, roads, etc.): Grazed, roads located nearby.	

Common Name	Botanical Name	Quantity
big sagebrush	*Artemisia tridentata*	5
green rabbitbrush	*Chrysothamnus viscidiflorus*	1
greasewood	*Sarcobatus vermiculatus*	1
bluebunch wheatgrass	*Agropyron spicatum*	8
cheatgrass	*Bromus tectorum*	Dom.
Sandberg's bluegrass	*Poa secunda*	2
medusahead	*Taeniatherum caput-medusae*	Dom.

Calico Resources Grassy Mountain Project
Vegetation Survey *Reporting Form*

TES Species Observed (circle one)**:** **YES** **(NO)**

☐ USFWS
☐ BLM
☐ State of Oregon

Common Name	Botanical Name	Quantity

Population Notes: No special status species observed.

Noxious Weeds/Invasive Species Observed (circle one)**:** **(YES)** **NO**

☐ Class A
☒ Class B
☒ Class C

Common Name	Botanical Name	Quantity
cheatgrass	*Bromus tectorum*	Dom.
medusahead	*Taeniatherum caput-medusae*	Dom.
Canada thistle	*Cirsium arvense*	N/A

Population Notes: Cheatgrass and medusahead are co-dominant weed species present within the transect. Canada thistle observed near northern boundary of mine area but outside of project study area.

Additional Vegetation Survey Notes: Cheatgrass and medusahead form a mat of cover. Not able to count individual plants.

Site Photographs (include photo #, brief description and direction)**:**

Photos 20-26, Camera D, overview of plant community and transect sampling location.

Calico Resources Grassy Mountain Project
Vegetation Survey *Reporting Form*

Project: Calico Resources – Grassy Mountain Exploration Project	**Transect Name/#: 3**

Field Surveyor(s): 5. Bob Waldher 6. Matt Modlin	Date: 06-18-12 Time: 1:35 PM Weather: Partly Cloudy
Location Description: Located in reclaimed area west of Twin Springs Road	GPS Coordinates N: 43.659 E: -117.409
Vegetation Class: (i.e., sagebrush/grassland: grassland) Crested Wheatgrass / Annual Grass	
Plot Size: 10' x 10'	
Section, Township, Range: 13, 22S, 43E	Datum: NAD 83
Land Ownership (BLM, private): Private (Bishop property)	Accuracy: +/- 1 Meter

Est. % bare ground: 40% - 45%	Aspect: N/A, Valley Bottom
Slope: 1% - 2%	Vegetation Height: 3" – 24"
Disturbance (grazing, roads, etc.): Heavily grazed.	

Common Name	Botanical Name	Quantity
buckwheat	*Erigonum sp.*	1
mustard	*Sisymbrium sp.*	3
crested wheatgrass	*Agropyron cristatum*	29
cheatgrass	*Bromus tectorum*	Dom.
Sandberg's bluegrass	*Poa secunda*	17
medusahead	*Taeniatherum caput-medusae*	Dom.

Calico Resources Grassy Mountain Project
Vegetation Survey *Reporting Form*

TES Species Observed (circle one)**:** **YES** **(NO)**

☐ USFWS
☐ BLM
☐ State of Oregon

Common Name	Botanical Name	Quantity

Population Notes: No special status species observed.

Noxious Weeds/Invasive Species Observed (circle one)**:** **(YES)** **NO**

☐ Class A
☐ Class B
☒ Class C

Common Name	Botanical Name	Quantity
cheatgrass	*Bromus tectorum*	Dom.
medusahead	*Taeniatherum caput-medusae*	Dom.

Population Notes: Cheatgrass and medusahead are co-dominant weed species present within the transect.

Additional Vegetation Survey Notes: Cheatgrass and medusahead form a mat of cover. Not able to count individual plants. Area appears to be reclaimed with crested wheatgrass seed mixture.

Site Photographs (include photo #, brief description and direction)**:**

Photos 42-47, Camera D, overview of plant community and transect sampling location.

Calico Resources Grassy Mountain Project
Vegetation Survey *Reporting Form*

Project: Calico Resources – Grassy Mountain Exploration Project	**Transect Name/#: 4**

Field Surveyor(s): 7. Bob Waldher 8. Matt Modlin	Date: 06-18-12 Time: 3:05 PM Weather: Partly Cloudy
Location Description: Adjacent to south side of proposed access road.	GPS Coordinates N: 43.671 E: -117.995
Vegetation Class: (i.e., sagebrush/grassland: grassland) Annual Grass	
Plot Size: 10' x 10'	
Section, Township, Range: 12, 22S, 43E	Datum: NAD 83
Land Ownership (BLM, private): BLM	Accuracy: +/- 1 Meter

Est. % bare ground: 10% - 15%	Aspect: West Facing
Slope: 3% - 5%	Vegetation Height: 4" – 30"
Disturbance (grazing, roads, etc.): Grazed, adjacent to existing access road.	

Common Name	Botanical Name	Quantity
pepperweed	*Lepidium perfoliatum*	2
tumble mustard	*Sisymbrium altissimum*	2
Austrian peaweed	*Sphaerophysa salusula*	3
moth mullein	*Verbascum blattaria*	6
crested wheatgrass	*Agropyron cristatum*	6
cheatgrass	*Bromus tectorum*	Dom.
Idaho fescue	*Festuca idahoensis*	86
medusahead	*Taeniatherum caput-medusae*	Dom.

Calico Resources Grassy Mountain Project
Vegetation Survey *Reporting Form*

TES Species Observed (circle one)**:** **YES** **(NO)**

☐ USFWS
☐ BLM
☐ State of Oregon

Common Name	Botanical Name	Quantity

Population Notes: No special status species observed.

Noxious Weeds/Invasive Species Observed (circle one)**:** **(YES)** **NO**

☒ Class A
☐ Class B
☒ Class C

Common Name	Botanical Name	Quantity
cheatgrass	*Bromus tectorum*	Dom.
medusahead	*Taeniatherum caput-medusae*	Dom.
Austrian peaweed	*Sphaerophysa salusula*	3

Population Notes: Cheatgrass and medusahead are co-dominant weed species present within the transect. Small population of Austrian peaweed observed in area.

Additional Vegetation Survey Notes: Cheatgrass and medusahead form a mat of cover. Not able to count individual plants.

Site Photographs (include photo #, brief description and direction)**:**

Photos 52-62, Camera D, overview of plant community and transect sampling location.

Calico Resources Grassy Mountain Project
Vegetation Survey *Reporting Form*

Project: Calico Resources – Grassy Mountain Exploration Project	**Transect Name/#: 5**
Field Surveyor(s): 9. Bob Waldher 10. Matt Modlin	Date: 06-18-12 Time: 3:50 PM Weather: Partly Cloudy
Location Description: East side of mine permit area.	GPS Coordinates N: 43.669 E: -117.355
Vegetation Class: (i.e., sagebrush/grassland: grassland) Sagebrush / Bunchgrass	
Plot Size: 10’ x 10’	
Section, Township, Range: 8, 22S, 44E	Datum: NAD 83
Land Ownership (BLM, private): BLM	Accuracy: +/- 1 Meter
Est. % bare ground: 30% - 35%	Aspect: South Facing
Slope: 0% - 2%	Vegetation Height: 4” – 42”
Disturbance (grazing, roads, etc.): Grazed, adjacent to existing access road.	

Common Name	**Botanical Name**	**Quantity**
big sagebrush	*Artemisia tridentata*	13
bluebunch wheatgrass	*Agropyron spicatum*	1
cheatgrass	*Bromus tectorum*	Dom.
Idaho fescue	*Festuca idahoensis*	66
Sandberg’s bluegrass	*Poa secunda*	3

Calico Resources Grassy Mountain Project
Vegetation Survey *Reporting Form*

TES Species Observed (circle one)**:** **YES** **(NO)**

☐ USFWS
☐ BLM
☐ State of Oregon

Common Name	Botanical Name	Quantity

Population Notes: No special status species observed.

Noxious Weeds/Invasive Species Observed (circle one)**:** **(YES)** **NO**

☐ Class A
☐ Class B
☒ Class C

Common Name	Botanical Name	Quantity
cheatgrass	*Bromus tectorum*	Dom.

Population Notes: Cheatgrass dominant weed species present within the transect.

Additional Vegetation Survey Notes: Cheatgrass forms a mat of cover. Not able to count individual plants.

Site Photographs (include photo #, brief description and direction)**:**

Photos 63-69, Camera D, overview of plant community and transect sampling location.

Calico Resources Grassy Mountain Project
Vegetation Survey *Reporting Form*

Project: Calico Resources – Grassy Mountain Exploration Project	**Transect Name/#: 6**
Field Surveyor(s): 11. Bob Waldher 12. Matt Modlin	Date: 06-19-12 Time: 9:00 AM Weather: Partly Cloudy
Location Description: Located on slope above Freezout Lake Road	GPS Coordinates N: 43.649 E: -117.435
Vegetation Class: (i.e., sagebrush/grassland: grassland) Sagebrush / Bunchgrass	
Plot Size: 10’ x 10’	
Section, Township, Range: 22, 22S, 43E	Datum: NAD 83
Land Ownership (BLM, private): Private (Bishop Property)	Accuracy: +/- 1 Meter
Est. % bare ground: 60%	Aspect: South Facing
Slope: 2% - 5%	Vegetation Height: 4” – 42”
Disturbance (grazing, roads, etc.): Heavily grazed, adjacent to existing access road.	

Common Name	**Botanical Name**	**Quantity**
big sagebrush	*Artemisia tridentata*	5
green rabbitbrush	*Chrysothamnus viscidiflorus*	1
cheatgrass	*Bromus tectorum*	Dom.
Misc. Grass Species		See Notes

Calico Resources Grassy Mountain Project
Vegetation Survey *Reporting Form*

TES Species Observed (circle one)**:** **YES** **(NO)**

☐ USFWS
☐ BLM
☐ State of Oregon

Common Name	Botanical Name	Quantity

Population Notes: No special status species observed.

Noxious Weeds/Invasive Species Observed (circle one)**:** **(YES)** **NO**

☐ Class A
☐ Class B
☒ Class C

Common Name	Botanical Name	Quantity
cheatgrass	*Bromus tectorum*	Dom.

Population Notes: Cheatgrass dominant weed species present within the transect.

Additional Vegetation Survey Notes: Cheatgrass forms a mat of cover. Not able to count individual plants. Some bunchgrass species could not be identified due to heavy grazing.

Site Photographs (include photo #, brief description and direction)**:**

Photos 12-17, Camera D, overview of plant community and transect sampling location.

Calico Resources Grassy Mountain Project
Vegetation Survey *Reporting Form*

Project: Calico Resources – Grassy Mountain Exploration Project	**Transect Name/#: 7**
Field Surveyor(s): 13. Bob Waldher 14. Matt Modlin	Date: 06-19-12 Time: 10:00 AM Weather: Partly Cloudy
Location Description: Located at proposed processing facility location.	GPS Coordinates N: 43.663 E: -117.407
Vegetation Class: (i.e., sagebrush/grassland: grassland) Annual Grass	
Plot Size: 10' x 10'	
Section, Township, Range: 13, 22S, 43E	Datum: NAD 83
Land Ownership (BLM, private): Private (Bishop Property)	Accuracy: +/- 1 Meter
Est. % bare ground: 2% - 3%	Aspect: East Facing
Slope: 3% - 5%	Vegetation Height: 4" – 12"
Disturbance (grazing, roads, etc.): Grazed, adjacent to existing access road.	

Common Name	**Botanical Name**	**Quantity**
blue mustard	*Chorispora tenalla*	1
prickly lettuce	*Lactuca serriola*	1
tumble mustard	*Sisymbrium altissimum*	9
cheatgrass	*Bromus tectorum*	Dom.

Calico Resources Grassy Mountain Project
Vegetation Survey *Reporting Form*

TES Species Observed (circle one)**:** **YES** **(NO)**

☐ USFWS
☐ BLM
☐ State of Oregon

Common Name	Botanical Name	Quantity

Population Notes: No special status species observed.

Noxious Weeds/Invasive Species Observed (circle one)**:** **(YES)** **NO**

☐ Class A
☐ Class B
☒ Class C

Common Name	Botanical Name	Quantity
cheatgrass	*Bromus tectorum*	Dom.

Population Notes: Cheatgrass dominant weed species present within the transect.

Additional Vegetation Survey Notes: Cheatgrass forms a mat of cover. Not able to count individual plants.

Site Photographs (include photo #, brief description and direction)**:**

Photos 18-24, Camera D, overview of plant community and transect sampling location.

Calico Resources Grassy Mountain Project
Vegetation Survey *Reporting Form*

Project: Calico Resources – Grassy Mountain Exploration Project	**Transect Name/#: 8**

Field Surveyor(s): 15. Bob Waldher 16. Matt Modlin	Date: 06-19-12 Time: 10:50 AM Weather: Partly Cloudy
Location Description: Adjacent to existing access road (outside project area)	GPS Coordinates N: 43.684 E: -117.363
Vegetation Class: (i.e., sagebrush/grassland: grassland) Sagebrush / Bunchgrass	
Plot Size: 10’ x 10’	
Section, Township, Range: 5, 22S, 44E	Datum: NAD 83
Land Ownership (BLM, private): BLM	Accuracy: +/- 1 Meter

Est. % bare ground: 65% - 70%	Aspect: Valley Bottom
Slope: 0% - 2%	Vegetation Height: 4” – 42”
Disturbance (grazing, roads, etc.): Heavily grazed, adjacent to existing access road.	

Common Name	Botanical Name	Quantity
big sagebrush	*Artemisia tridentata*	3
green rabbitbrush	*Chrysothamnus viscidiflorus*	2
crested wheatgrass	*Agropyron cristatum*	4
cheatgrass	*Bromus tectorum*	Dom.
Sandberg’s bluegrass	*Poa secunda*	112

Calico Resources Grassy Mountain Project
Vegetation Survey *Reporting Form*

TES Species Observed (circle one)**:** **YES** **(NO)**

☐ USFWS
☐ BLM
☐ State of Oregon

Common Name	Botanical Name	Quantity

Population Notes: No special status species observed.

Noxious Weeds/Invasive Species Observed (circle one)**:** **(YES)** **NO**

☐ Class A
☐ Class B
☒ Class C

Common Name	Botanical Name	Quantity
cheatgrass	*Bromus tectorum*	Dom.

Population Notes: Cheatgrass dominant weed species present within the transect.

Additional Vegetation Survey Notes: Cheatgrass forms a mat of cover. Not able to count individual plants.

Site Photographs (include photo #, brief description and direction)**:**

Photos 25-29, Camera D, overview of plant community and transect sampling location.

Daubenmire

Study Number	Date	Examiner	Allotment Name & Number	Pasture
BASELINE VEG.	5/7/13	R. WALDHER	Sagebrush/ Bunchgrass Community	

Transect Number and Location: DAUBENMIRE - 1, 30 FT SOUTH OF PROPOSED ACCESS ROAD

Number of Quadrats: 50

Plant Species	Quadrat 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
ARTR															4	3			1				2		
CHVI																							1		
POSE	1			1		3		1	2		1		1		1			3							2
AGSP	4	2	2		2	1					5			4			2								2
ERSP		1	1			1	1			1			3			2				1					
PHLOX				1	1		1			1		1				1				1		1	1	1	
BRTE			1		1	1			1	2		1	1	1	1	1	1	1	3	2	3	2	1	2	

Plant Species	Quadrat 26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
ARTR	1	3	2	2	1		3		2	1	1		3	2						5	1				
CHVI													1												
POSE	1				3	1			1	1	2	1		1	2	3		2			2			1	1
AGSP			2	1				1	2						1	2	4	2	5		1	1			1
ERSP	2	2			1					3			1												
PHLOX	1	1	1	1								1	1	2					1	1					
BRTE			1		1	3	2	1			2	2	1	1	3	1			1	2	1		1	1	1

Daubenmire Summary

Study Number	Date	Examiner	Allotment Name & Number	Pasture
BASELINE VEG.	5/7/13	R. WALDHER	Sagebrush / Bunchgrass Community	

Study Location: DAUBENMIRE - 1, 30 FT SOUTH OF PROPOSED ACCESS ROAD

Number of Quadrats: 50

Cover Class	Mid-Point	Species		Species		Species		Species		Species		Species		Species		Species		Species		Species	
		ARTR		CHVI		POSE		AGSP		ERSP		PHLOX		BRTE							
		Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product
1 1-5%	2.5	6	15	2	5	14	35	7	17.5	8	20	18	45	23	57.5						
2 5-25%	15	5	75	-	-	6	90	9	135	3	45	1	15	8	120						
3 26-50%	37.5	4	150	-	-	4	150	-	-	2	75	-	-	4	150						
4 51-75%	62.5	1	62.5	-	-	-	-	3	187.5	-	-	-	-	-	-						
5 76-95%	85	1	85	-	-	-	-	2	170	-	-	-	-	-	-						
6 96-100%	97.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Total canopy			387.5		5		275		510		140		60		327.5						
Number of Samples			50		50		50		50		50		50		50						
% canopy cover			8		-		6		10		3		1		7						
Species composition			23		-		17		29		9		3		20						
Frequency			34		4		48		42		26		38		70						

Daubenmire

Study Number	Date	Examiner	Allotment Name & Number	Pasture
BASELINE VEG.	5/7/13	R. WALDHER	Crested Wheatgrass Community	

Transect Number and Location: DAUBENMIRE - 2, 100 YDS EAST OF TWIN SPRINGS ROAD

Number of Quadrats: 50

Plant Species	Quadrat																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
AGCR	2	3	1	2	3			3	1	3		2	2		4	4	3	1				2	3	1	2
BRTE	2								1	1			1	2	1	2	1								
POSE	1	2	2	1	1	4	3	2	4	1	1	1	2	1				1			1	1	1	1	

Plant Species	Quadrat																								
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
AGCR	1	3	2	3	2		1	4	2	2	2	3			1	1	1	2	3	2	1	3	3		2
BRTE	1	1					1		1			1					1								
POSE	1	1				1			1		1	1						1			2	1			

Daubenmire Summary

Study Number	Date	Examiner	Allotment Name & Number	Pasture
BASELINE VEG.	5/7/13	R. WALDHER	Crested Wheatgrass Community	

Study Location: DAUBENMIRE - 2, 100 YDS WEST OF TWIN SPRINGS ROAD

Number of Quadrats: 50

Cover Class	Mid-Point	Species AGCR		Species BRTE		Species POSE		Species		Species		Species		Species		Species		Species		Species		Species	
		Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product
1 1-5%	2.5	10	25	11	27.5	20	50																
2 5-25%	15	14	210	3	45	5	75																
3 26-50%	37.5	12	450	-	-	1	37.5																
4 51-75%	62.5	3	187.5	-	-	2	125																
5 76-95%	85	-	-	-	-	-	-																
6 96-100%	97.5	-	-	-	-	-	-																
Total canopy			872.5		72.5		287.5																
Number of Samples			50		50		50																
% canopy cover			17		1		6																
Species composition			71		4		25																
Frequency			78		28		56																

Daubenmire

Page 1 of 1

Study Number	Date	Examiner	Allotment Name & Number	Pasture
BASELINE VEG.	5/7/13	R. WALDHER	Annual Grass Community	

Transect Number and Location: DAUBENMIRE-3, 200 FT WEST OF TWIN SPRINGS ROAD

Number of Quadrats: 50

Plant Species	Quadrat																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
BRTE	5	4	2	1	2	3	2	1	3	3	2	3	1			1	1	4	5	5	5	5	4	2	3
POSE			2	1		1	2							1	2	2							1	2	
AGSP				1				1																	
LASE		1			2		1			1	1	2	2	1	1		2	1							
ELCA			1	1		1			1	1	1					1	2				1	1		1	1

Plant Species	Quadrat																								
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
BRTE	3	2	4	4	5	4	4	2	4	5	5	4	5	5	6	5	4	4	3	5	6	5	5	5	6
POSE	1	1										1	1	1			2	1	2			1	1		
AGSP			1	1																					
LASE			1	1																					
ELCA	1	1	1	1		1		2	2	1					1	1	1	1	2						

Daubenmire Summary

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Study Number	Date	Examiner	Allotment Name & Number	Pasture
BASELINE VEG.	5/7/13	R. WALDHER	Annual Grass Community	

Study Location	Number of Quadrats
DAUBENMIRE - 3 200 FT WEST OF TWIN SPRINGS ROAD	50

Cover Class	Mid-Point	Species		Species		Species		Species		Species		Species		Species		Species		Species		Species		Species	
		BRTE		POSE		AGSP		LASE		ELCA														
		Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product
1 1-5%	2.5	5	12.5	12	30	4	10	9	22.5	21	52.5														
2 5-25%	15	7	105	7	105	-	-	4	60	4	10														
3 26-50%	37.5	7	262.5	-	-	-	-	-	-	-	-														
4 51-75%	62.5	11	687.5	-	-	-	-	-	-	-	-														
5 76-95%	85	15	1275	-	-	-	-	-	-	-	-														
6 96-100%	97.5	3	292.5	-	-	-	-	-	-	-	-														
Total canopy			2635		135		10		82.5		62.5														
Number of Samples			50		50		50		50		50														
% canopy cover			53		3		-		2		1														
Species composition			90		5		-		3		2														
Frequency			96		38		8		26		50														

C

Appendix C.

State of Oregon Sensitive Plant Species List

Appendix C Grassy Mountain Exploration Project Terrestrial Vegetation Report – State Sensitive Species List (Vale District)		
Scientific Name	**Common Name**	**BLM Occurrence Status (Vale District)**
ANTHELIA JULACEA	LIVERWORT	Suspected
BARBILOPHOZIA LYCOPODIOIDES	LIVERWORT	Suspected
JUNGERMANNIA POLARIS	LIVERWORT	Suspected
LOPHOZIA GILLMANII	LIVERWORT	Suspected
PELTOLEPIS QUADRATA	LIVERWORT	Suspected
PREISSIA QUADRATA	LIVERWORT	Suspected
PTILIDIUM PULCHERRIMUM	LIVERWORT	Suspected
SCHISTIDIUM CINCLIDODONTEUM	MOSS	Suspected
TEXOSPORIUM SANCTI-JACOBI	LICHEN	Suspected
ABRONIA TURBINATA	TRANS MONTANE ABRONIA	Documented
ACHNATHERUM SPECIOSUM	DESERT NEEDLEGRASS	Suspected
ACHNATHERUM WALLOWAENSIS	WALLOWA RICEGRASS	Suspected
AGASTACHE CUSICKII	CUSICK'S GIANT-HYSSOP	Documented
ALLENROLFEA OCCIDENTALIS	IODINE BUSH	Documented
ALLIUM GEYERI VAR. GEYERI	GEYER'S ONION	Suspected
AMSINCKIA CARINATA	MALHEUR VALLEY FIDDLENECK	Documented
ARGEMONE MUNITA	PRICKLY-POPPY	Documented
ARTEMISIA ARBUSCULA SSP. LONGICAULIS	LAHONTAN SAGEBRUSH	Documented
ARTEMISIA PAPPOSA	OWYHEE SAGEBRUSH	Documented
ASPLENIUM TRICHOMANES-RAMOSUM	GREEN SPLEENWORT	Suspected
ASTRAGALUS CALYCOSUS	KING'S RATTLEWEED	Documented
ASTRAGALUS CUSICKII VAR. STERILIS	STERILE MILK-VETCH	Documented
ASTRAGALUS GEYERI VAR. GEYERI	GEYER'S MILK-VETCH	Documented
ASTRAGALUS MULFORDIAE	MULFORD'S MILK-VETCH	Documented
ASTRAGALUS PLATYTROPIS	BROAD-KEELED MILK-VETCH	Documented
BOTRYCHIUM ASCENDENS	UPWARD-LOBED MOONWORT	Suspected
BOTRYCHIUM CAMPESTRE	PRAIRIE MOONWORT	Suspected
BOTRYCHIUM CRENULATUM	CRENULATE MOONWORT	Suspected
BOTRYCHIUM HESPERIUM	WESTERN MOONWORT	Suspected
BOTRYCHIUM LINEARE	SLENDER MOONWORT	Suspected
BOTRYCHIUM LUNARIA	MOONWORT	Suspected
BOTRYCHIUM MONTANUM	MOUNTAIN GRAPE-FERN	Suspected
BOTRYCHIUM PARADOXUM	TWIN-SPIKED MOONWART	Suspected
BOTRYCHIUM PEDUNCULOSUM	STALKED MOONWORT	Suspected
BUPLEURUM AMERICANUM	BUPLEURUM	Documented
CALOCHORTUS MACROCARPUS VAR. MACULOSUS	GREEN-BAND MARIPOSA-LILY	Documented
CALOCHORTUS NITIDUS	BROAD-FRUIT MARIPOSA-LILY	Suspected
CAMISSONIA PYGMAEA	DWARF EVENING-PRIMROSE	Suspected
CAREX ATROSQUAMA	BLACKENED SEDGE	Suspected
CAREX CAPILLARIS	HAIRLIKE SEDGE	Suspected
CAREX CORDILLERANA	CORDILLERAN SEDGE	Documented
CAREX GYNOCRATES	YELLOW BOG SEDGE	Suspected
CAREX IDAHOA	IDAHO SEDGE	Suspected
CAREX LASIOCARPA VAR. AMERICANA	SLENDER SEDGE	Suspected
CAREX MEDIA	INTERMEDIATE SEDGE	Suspected
CAREX MICROPODA	PYRENAEAN SEDGE	Suspected
CAREX NARDINA	SPIKENARD SEDGE	Suspected
CAREX PELOCARPA	NEW SEDGE	Suspected
CAREX RETRORSA	RETRORSE SEDGE	Suspected
CAREX SUBNIGRICANS	DARK ALPINE SEDGE	Suspected
CAREX VERNACULA	NATIVE SEDGE	Suspected
CASTILLEJA FLAVA VAR. RUSTICA	RURAL PAINTBRUSH	Documented
CASTILLEJA FRATERNA	FRATERNAL PAINTBRUSH	Suspected
CASTILLEJA RUBIDA	PURPLE ALPINE PAINTBRUSH	Suspected
CAULANTHUS CRASSICAULIS VAR. GLABER	SMOOTH WILD CABBAGE	Documented
CAULANTHUS MAJOR VAR. NEVADENSIS	SLENDER WILD CABBAGE	Documented
CHAENACTIS XANTIANA	DESERT CHAENACTIS	Documented
CHAETADELPHA WHEELERI	WHEELER'S SKELETON-WEED	Documented
CHEILANTHES FEEI	FEE'S LIP-FERN	Suspected

COLLOMIA RENACTA	BARREN VALLEY COLLOMIA	Documented
CRYPTOGRAMMA STELLERI	STELLER'S ROCKBRAKE	Suspected
CYMOPTERUS ACAULIS VAR. GREELEYORUM	GREELEY'S CYMOPTERUS	Documented
CYMOPTERUS IBAPENSIS	IBAPAH WAVEWING	Documented
CYPERUS LUPULINUS SSP. LUPULINUS	A CYPERUS	Suspected
CYPRIPEDIUM FASCICULATUM	CLUSTERED LADY'S-SLIPPER	Suspected
DELPHINIUM BICOLOR	FLATHEAD LARKSPUR	Documented
DODECATHEON PULCHELLUM VAR. SHOSHONENSE	DARKTHROAT SHOOTINGSTAR	Documented
ELATINE BRACHYSPERMA	SHORT SEEDED WATERWORT	Documented
ELEOCHARIS BOLANDERI	BOLANDER'S SPIKERUSH	Documented
ERIGERON DISPARIPILUS	WHITE CUSHION ERIGERON	Suspected
ERIGERON ENGELMANNII VAR. DAVISII	ENGELMANN'S DAISY	Suspected
ERIGERON LATUS	BROAD FLEABANE	Documented
ERIOGONUM CHRYSOPS	GOLDEN BUCKWHEAT	Documented
ERIOGONUM HOOKERI	HOOKER'S WILD BUCKWHEAT	Documented
ERIOGONUM PROCIDUUM	PROSTRATE BUCKWHEAT	Documented
ERIOGONUM SALICORNIOIDES	PLAYA BUCKWHEAT	Documented
GEUM ROSSII VAR. TURBINATUM	SLENDER-STEMMED AVENS	Suspected
HACKELIA CRONQUISTII	CRONQUIST'S STICKSEED	Documented
HACKELIA OPHIOBIA	THREE FORKS STICKSEED	Documented
HELIOTROPIUM CURASSAVICUM	SALT HELIOTROPE	Documented
HYMENOXYS LEMMONII	COOPER'S GOLDFLOWER	Documented
IVESIA RHYPARA VAR. RHYPARA	GRIMY IVESIA	Documented
IVESIA SHOCKLEYI	SHOCKLEY'S IVESIA	Documented
JUNCUS TRIGLUMIS VAR. ALBESCENS	THREE-FLOWERED RUSH	Suspected
KOBRESIA MYOSUROIDES	BELLARD'S KOBRESIA	Suspected
KOBRESIA SIMPLICIUSCULA	SIMPLE KOBRESIA	Suspected
LEPIDIUM DAVISII	DAVIS' PEPPERGRASS	Documented
LIPOCARPHA ARISTULATA	ARISTULATE LIPOCARPHA	Suspected
LISTERA BOREALIS	NORTHERN TWAYBLADE	Suspected
LOMATIUM ERYTHROCARPUM	RED-FRUITED LOMATIUM	Suspected
LOMATIUM FOENICULACEUM SSP. FIMBRIATUM	FRINGED DESERT-PARSLEY	Documented
LOMATIUM ROSEANUM	ROSE'S LOMATIUM	Documented
LUPINUS CUSICKII VAR. CUSICKII	CUSICK'S LUPINE	Documented
LUPINUS NEVADENSIS	NEVADA LUPINE	Documented
LYCOPODIUM COMPLANATUM	GROUND CEDAR	Suspected
MALACOTHRIX SONCHOIDES	LYRATE MALACOTHRIX	Documented
MENTZELIA CONGESTA	UNITED BLAZINGSTAR	Documented
MENTZELIA MOLLIS	SMOOTH MENTZELIA	Documented
MIMULUS EVANESCENS	DISAPPEARING MONKEYFLOWER	Documented
MIMULUS HYMENOPHYLLUS	MEMBRANE-LEAVED MONKEYFLOWER	Suspected
MIRABILIS MACFARLANEI	MACFARLANE'S FOUR O'CLOCK	Suspected
MUHLENBERGIA MINUTISSIMA	ANNUAL DROPSEED	Documented
OPHIOGLOSSUM PUSILLUM	ADDER'S-TONGUE	Suspected
OXYTROPIS SERICEA VAR. SERICEA	WHITE LOCOWEED	Documented
PELLAEA BRIDGESII	BRIDGES' CLIFF-BRAKE	Suspected
PHACELIA INUNDATA	PLAYA PHACELIA	Documented
PHACELIA LUTEA VAR. MACKENZIEORUM	MACKENZIE'S PHACELIA	Documented
PHACELIA MINUTISSIMA	DWARF PHACELIA	Suspected
PHLOX HENDERSONII	HENDERSON'S PHLOX	Suspected
PHLOX MULTIFLORA	MANY-FLOWERED PHLOX	Suspected
PHYSARIA CHAMBERSII	CHAMBERS' TWINPOD	Documented
PINUS ALBICAULIS	WHITEBARK PINE	Documented
PLATANTHERA OBTUSATA	SMALL NORTHERN BOG-ORCHID	Suspected
PLEUROPOGON OREGONUS	OREGON SEMAPHOREGRASS	Suspected
POGOGYNE FLORIBUNDA	PROFUSE-FLOWEREED MESA MINT	Documented
POTAMOGETON DIVERSIFOLIUS	RAFINESQUE'S PONDWEED	Documented
PRENANTHELLA EXIGUA	DESERT PRENANTHELLA	Documented
PYRROCOMA RADIATA	SNAKE RIVER GOLDENWEED	Documented
PYRROCOMA SCABERULA	ROUGH PYRROCOMA	Documented
RAFINESQUIA CALIFORNICA	CALIFORNIA CHICORY	Documented
RORIPPA COLUMBIAE	COLUMBIA CRESS	Suspected
RUBUS BARTONIANUS	BARTONBERRY	Documented

SALIX FARRIAE	FARR'S WILLOW	Suspected
SALIX WOLFII	WOLF'S WILLOW	Suspected
SAXIFRAGA ADSCENDENS SSP. OREGONENSIS	WEDGE-LEAF SAXIFRAGE	Suspected
SENECIO ERTTERAE	ERTTER'S SENECIO	Documented
SILENE SPALDINGII	SPALDING'S CATCHFLY	Documented
STANLEYA CONFERTIFLORA	BIENNIAL STANLEYA	Documented
SUKSDORFIA VIOLACEA	VIOLET SUKSDORFIA	Suspected
SYMPHORICARPOS LONGIFLORUS	LONG-FLOWERED SNOWBERRY	Documented
THALICTRUM ALPINUM	ALPINE MEADOWRUE	Suspected
THELYPODIUM EUCOSMUM	ARROW-LEAF THELYPODY	Suspected
THELYPODIUM HOWELLII SSP. SPECTABILIS	HOWELL'S SPECTACULAR THELYPODY	Suspected
TOWNSENDIA MONTANA	MOUNTAIN TOWNSENDIA	Suspected
TOWNSENDIA PARRYI	PARRY'S TOWNSENDIA	Suspected
TRIFOLIUM DOUGLASII	DOUGLAS' CLOVER	Suspected
TRIFOLIUM LEIBERGII	LEIBERG'S CLOVER	Documented
TRIFOLIUM OWYHEENSE	OWYHEE CLOVER	Documented
TROLLIUS LAXUS SSP. ALBIFLORUS	AMERICAN GLOBEFLOWER	Suspected
UTRICULARIA MINOR	LESSER BLADDERWORT	Suspected

D

Appendix D.

Malheur County Noxious Weed Species List

Public Notice
Malheur County Noxious Weed Control

WEED DISTRICT: The entire Malheur County is a weed control district known as the Malheur County Weed District. The weed district is governed by the Malheur County Court upon recommendations from the Malheur County Weed Advisory Board.

DESIGNATION OF NOXIOUS WEEDS: Pursuant to ORS 570.575 the following named plants are designated by the Malheur County Court to be injurious to public health, crops, livestock, land, or other property and are noxious.

It is the responsibility of private landowners the County, State and Federal governments to eradicate and control these weeds on their respective jurisdictions. Malheur County has prioritized control and/or eradication of these noxious weeds by "A" "B" & "C" classes, with Class A having the highest priority. Priorities may be adjusted by geographic areas at the recommendation of the Weed Advisory Board.

CLASS "A" WEED: A weed of known economic/environmental importance known to occur in the county in very small numbers to make eradication practicable, or not known to occur but its status in surrounding counties makes future occurrence seem imminent.

ACTION – infestations are subject to mandatory control/eradication where found with possible county assistance when funds are available.

COMMON NAME	*SCIENTIFIC NAME*
Austrian Peaweed	*Sphaerophysa salusula*
Common Crupina	*Crupina Vulgaris*
Big-Headed knapweed	*Centaurea macrocephala*
Buffalobur	*Solanum rostratum*
Camelthorn	*Alhagi pseudalhagi*
Dalmation toadflax	*Centaurea diffusa*
Dyers woad	*Isatis tinctoria*
Featherheaded knapweed	*Centaurea trichocephala*
Hydrilla	*Hydrilla venticillata*
Iberian starthistle	*Centaurea iberica*
Italian thistle	*Carduus pycnocephalus*
Jimsonweed	*Datera stramonium*
Johnsongrass	*Sorgum halepense*
Jointed goatgrass	*Aegilops cylindrical*

COMMON NAME	*SCIENTIFIC NAME*
Leafy spurge	*Euphorbia esula*
Meadow knapweed	*Centaurea pratensis*
Mediterranean sage	*Salvia aethiopis*
Milk thistle	*Silybum marianum*
Perennial pepperweed	*Lepidium latifolium*
Purple nutsedge	*Cyperus rotundus*
Purple starthistle	*Centaurea calcitrapa*
Rush skeletonweed	*Chondrilla juncea*
Short-fringe knapweed	*Centaurea nigrescens*
Silverleaf knightshade	*Solanum elaegnifolium*
Skeletonleaf bursage	*Ambrosia tomentosa*
Slender-flowered thistle	*Carduus tenuiflorus*
Smooth distaff thistle	*Carthamus baericus*
Spiny cocklebur	*Xanthium spinosum*
Spotted knapweed	*Centaurea maculosa*
Squarrose knapweed	*Centaurea virgata*
St. Johnswort (Klamath weed)	*Hypericum perforatum*
Sulfur cinquefoil	*Potentilla recta*
Wild proso millet	*Panicum miliaceum*
Tansy ragwort	*Senecio jacobaea*
Wooly distaff thistle	*Carthamus lanatus*
Yellow toadflax	*Linaria vulgaris*
Yellow starthistle	*Centaurea solstitialis*

* *Class "A" Weed only in that part of Malheur County south of the road leading from the junction of Malheur County line and McBride Creek Road, west to Leslie Gulch Road, to Lake Owyhee and the area south of the road leading from the Rinehart Ranch to the Crowley Road west to Highway 78, north to the Malheur County line.*

CLASS "B" WEED – A weed of known economic/environmental importance and of moderate to wide distribution and highly invasive, subject to intensive control or eradication where feasible at the county level.

ACTION – Infestations are subject to control where found, with possible county assistance when funds are available. All CLASS"B" weeds are required to be controlled within 50 feet of all property lines, easements and rights of way, pursuant to ORS 570.525

COMMON NAME	*SCIENTIFIC NAME*
Canada thistle	*Cirsium arvense*
Houndstongue	*Cynoglossum officinale*
Musk thistle	*Carduus nutans*
Perennial pepperweed	*Lepidium latifolium*
Purple loosestrife	*Lythrum salicaria*
Scotch thistle	*Onopordum acanthium*
Hoary cress (White Top)	*Lepidium spp.*
Russian knapweed	*Acroptilon repens*

** Owners or occupants having Russian knapweed are required to control a minimum 20% of their annual infestation per discreet parcel of land per year. This includes the 50 foot buffer plus additional amounts to total 20% of the infestation.

CLASS "C" WEED – A weed of known economic/environmental importance and of general distribution, that is subject to control or eradication as local conditions warrant.

ACTION – Infestations treated at landowners discretion.

COMMON NAME	*SCIENTIFIC NAME*
Bull thistle	*Cirsium vulgare*
Cheatgrass	*Bromus tectorum*
Dodder	*Cuscutta spp.*
Field bindweed	*Convolvulus arvensis*
Halogeton	*Halogeton glomeratus*
Kochia	*Kochia scoparia*
Medusahead rye	*Taeniatherum caput-medusae*
Poison hemlock	*Conium maculatum*
Puncturevine	*Tribulus terrestris*
Quackgrass	*Agropyron repens*
Common ragweed	*Ambrosia artimisiifolia*
Salt cedar	*Tamarix parviflora*
Sweet clover	*Melilotus officinalis*
Western horsetail	*Equisetum arvense*
Yellow nutsedge	*Cyperus esculentus*

Grassy Mountain Project (April 2015)

Draft Terrestrial Vegetation Baseline Study Addendum #1

Grassy Mountain Exploration Project

Calico Resources USA Corporation

Malheur County, Oregon

July 2015

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Acronyms

BLM	Bureau of Land Management
Calico	Calico Resources USA Corporation
HDR	HDR Engineering, Inc.
TES	threatened and endangered species

Section 1: Introduction

This terrestrial vegetation baseline study addendum has been prepared in support of the Grassy Mountain Project (Project) in Malheur County, Oregon, which is being developed by Calico Resources USA Corporation (Calico). This addendum updates the *Draft Terrestrial Vegetation Baseline Study* (HDR 2014).

As noted in the 2014 study, the purpose of the terrestrial vegetation baseline study is to characterize the pre-project terrestrial vegetation communities, including species diversity; presence or absence of federally-listed threatened, endangered and sensitive (TES) species; Oregon and Bureau of Land Management (BLM) sensitive species; and condition and presence of noxious weeds. The baseline study will be used to support future mine permitting.

1.1 Project Area Description

As shown in **Figure 1**, the Project is located in Malheur County, Oregon, about 25 miles south-southwest of the City of Vale. The Project area, shown in **Figure 2**, encompasses portions of Section 8, Township 22 South, Range 44 East and Section 7, Township 22 South, Range 44 East. The project is accessed via Highway 20, west from Vale, to Russell Road. The site is approximately 25 miles south up Russell Road and Twin Springs Road.

The project area acreage includes the following:

Mine area	62 acres
Processing, tailings management and administration	626 acres
Total project area	688 acres

1.1.1 Resource Study Area

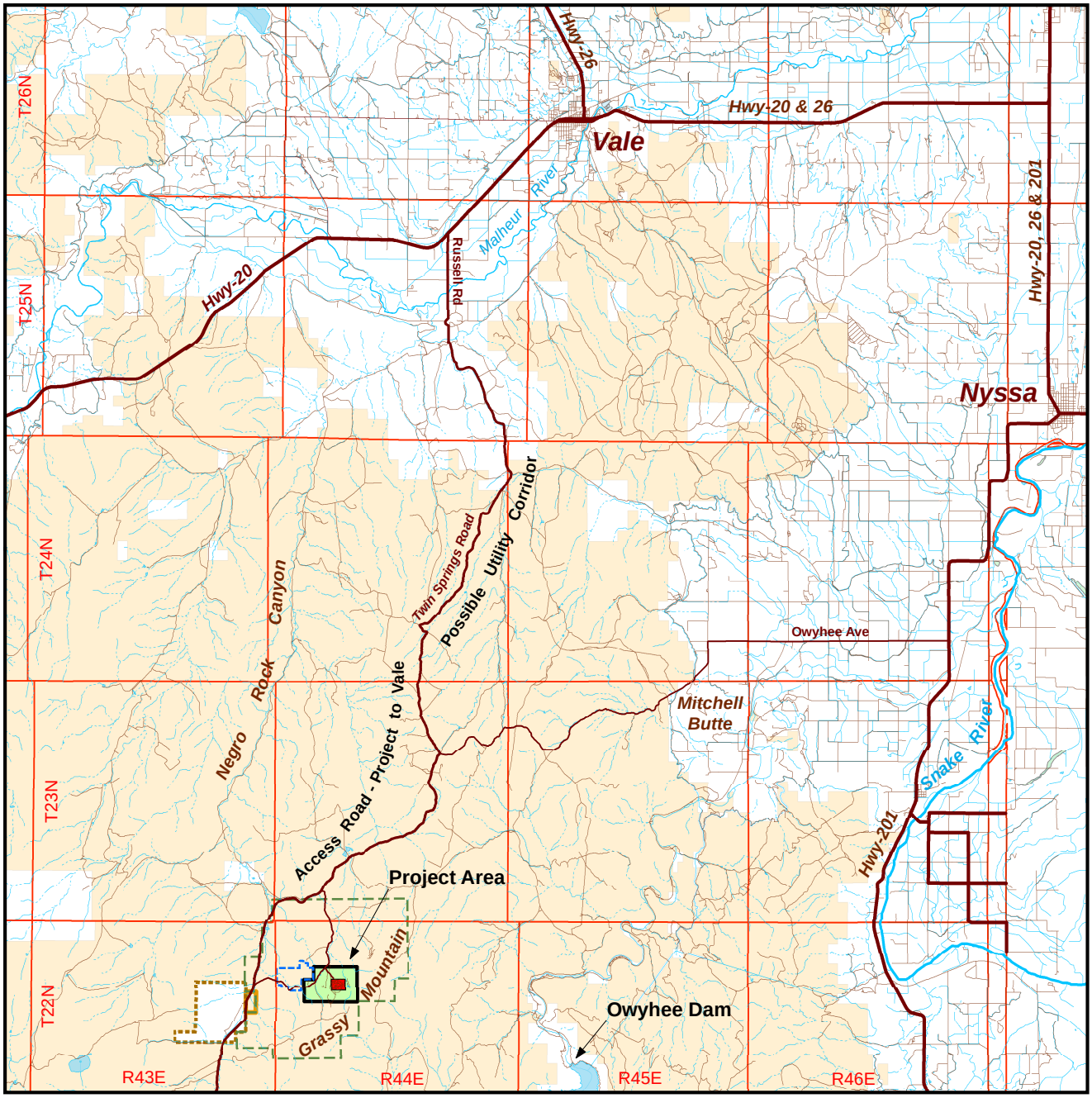
In early 2015, Calico identified approximately 310 acres of land managed by BLM that may be used to support future mining activities. The study area for this addendum includes this BLM land and the proposed Twin Springs Road access corridor, which could be upgraded to connect mine features and provide improved vehicle access between Vale, Oregon, and the Project. Much of the proposed access road corridor is currently maintained by BLM. The terrestrial vegetation study area is shown in **Figure 3**.

1.2 Baseline Study Overview

HDR's (HDR, Inc.) field survey team conducted field studies for this baseline study addendum on April 8 and 16, 2015, according to the regulatory framework and methodology set forth in the *Final Revised Environmental Baseline Study Work Plans* (HDR 2013).

The survey team used the Daubenmire vegetation sampling method for sampling vegetation attributes at six locations. This method consists of systematically placing a 20-centimeter by 50-centimeter quadrant frame along a 100-foot measuring tape and determining vegetation characteristics of canopy cover, frequency, and composition by canopy cover. HDR recorded the

information collected in the field on standardized Daubenmire field forms, which are included in **Appendix B**. Chapter 2 provides photos and descriptions of the six Daubenmire surveys.



Property Explanation

- Calico unpatented claims
- other unpatented claims
- Fee - surface & minerals
- Fee - minerals only
- Patented Claims
- Project Area
- BLM administered lands

N

0 1 2 3 4 5 km

0 1 2 3 miles

CALICO RESOURCES

Grassy Mountain Project
Malheur Co, Oregon

Location Map
July 2015

Figure 1. Project Location Map

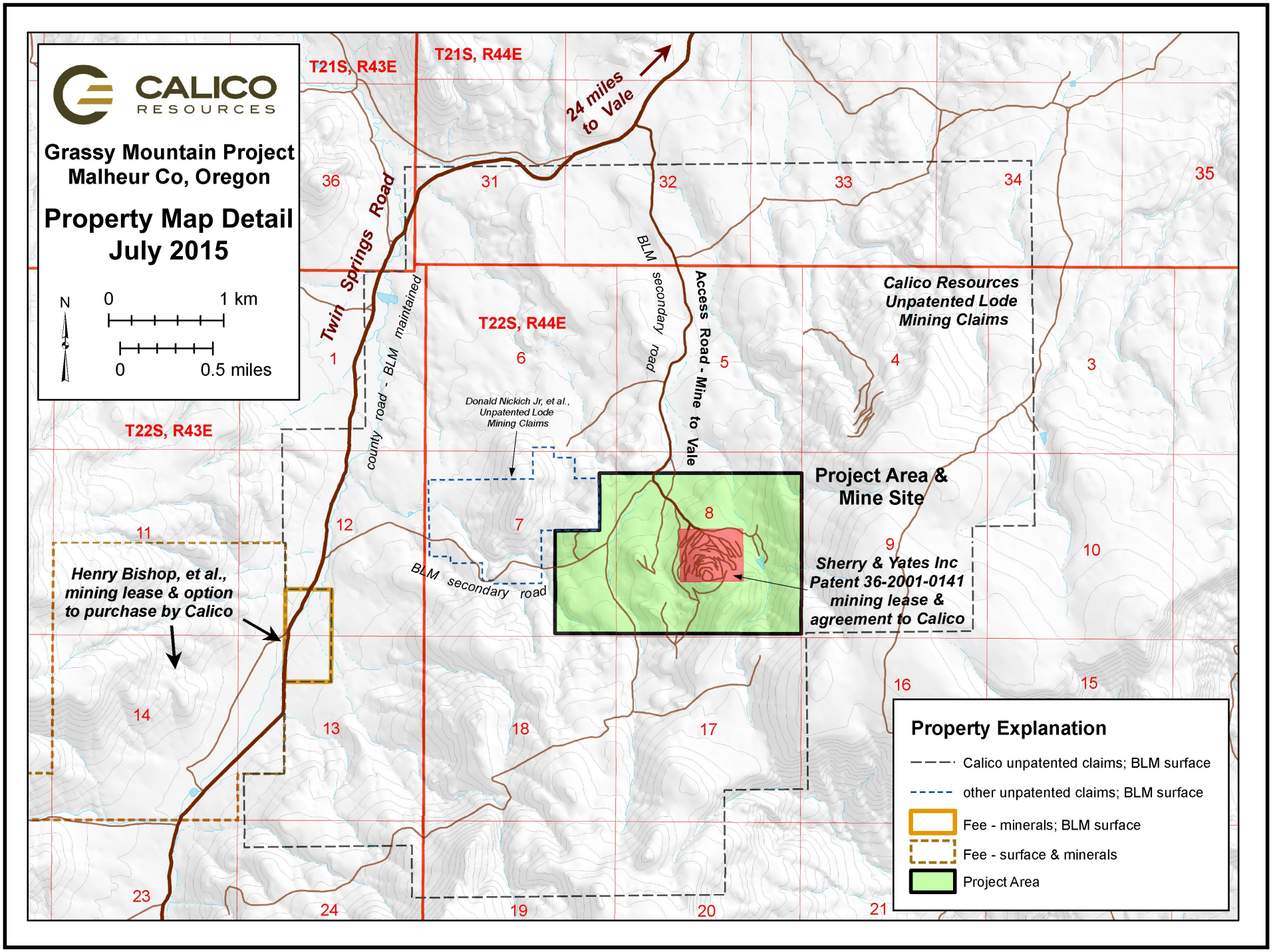
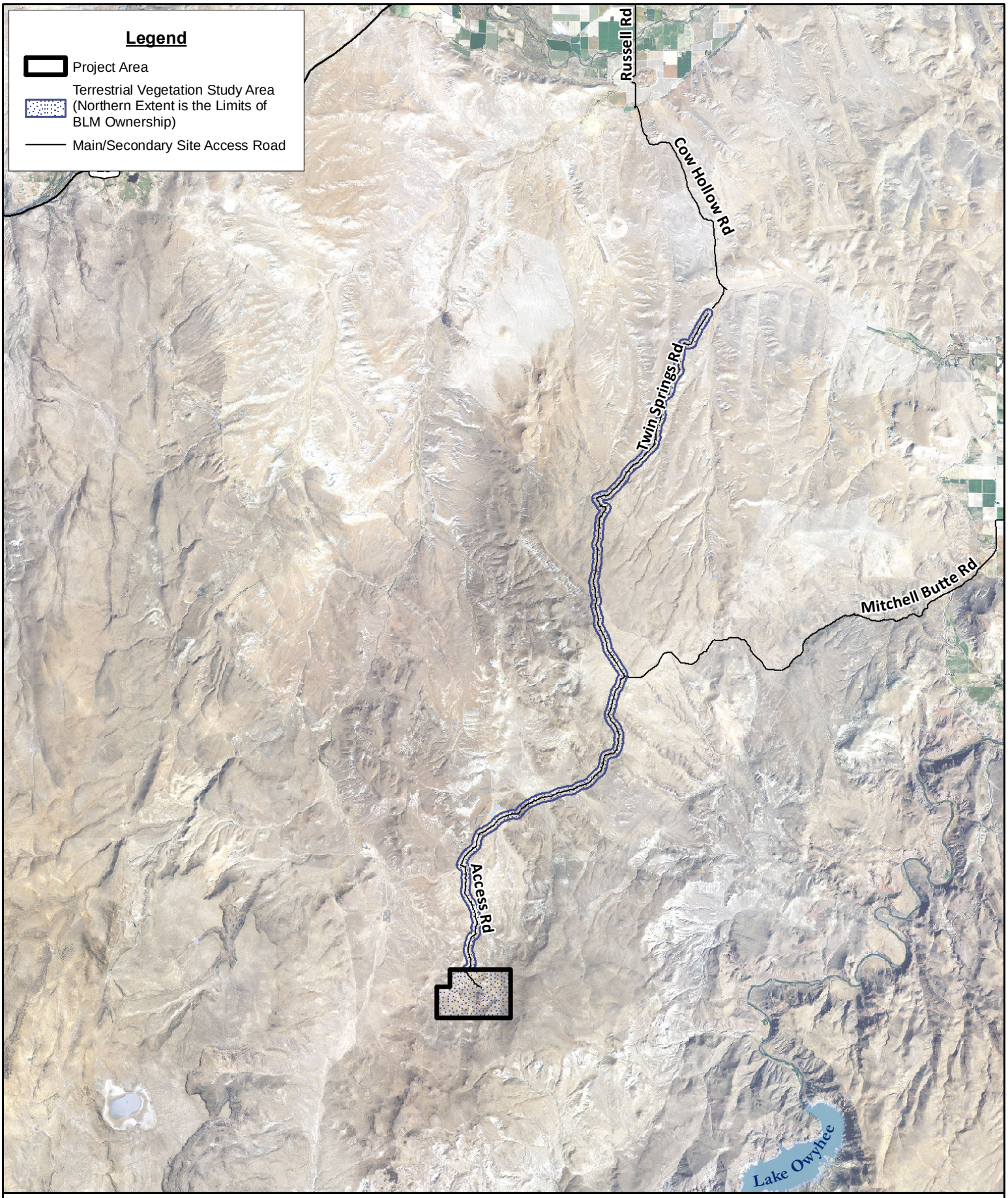


Figure 2. Property Map Detail



0 2.25 4.5
Miles

Imagery: 2014 NAIP 1 meter resolution
Source: NRCS/USDA Digital Gateway
Other Data Sources: USGS; US Census Bureau

Figure 3. Vegetation Study Area
Calico Resources, Grassy Mountain Project
Malheur County, OR

Map Production Date: 7/29/2015
Document: Q:\CalicoResources\GrassyMountain\map_docs\Vicinity_LetPort.mxd

Section 2: Baseline Characterization

2.1 Plant Community Description

Vegetation within the study area is a desert-rangeland type where sagebrush and grasses are the dominant species. The area has been extensively grazed for a number of years. Portions of the study area appear to have been re-seeded at one time with a crested wheatgrass (*Agropyron cristatum*) dominated seed mix.

Figure 4 shows the vegetation community types identified within the study area:

- sagebrush/bunchgrass
- crested wheatgrass/annual grass
- annual grass

Cheatgrass (Bromus tectorum), an invasive annual species, was common in nearly every plant community.

Photo 1. Spring 2015 Conditions

During the spring 2015 vegetation surveys, HDR's survey team did not observe any TES species, Oregon and BLM sensitive species, or noxious weeds within the six Daubenmire transects they surveyed. **Appendix A** contains a list of vegetation species observed at the Grassy Mountain Project. The survey team did observe cattle and sheep grazing at several locations within the study area. Most grass species were fully emerged and spring flowering forb species were in peak bloom. **Photo 1** shows the general growing conditions at the time of the 2015 spring survey.

2.2 Daubenmire Sampling Results

2.2.1 Daubenmire #1-2015 – Sagebrush/Bunchgrass Community

HDR's survey team performed a Daubenmire vegetation survey at 117.365E, 43.671N, located in Section 8, Township 22 South, Range 44 East (**Figure 4**). The sampling plot is located on BLM land in the Project area within the sagebrush/bunchgrass vegetation community. Information for Daubenmire #1-2015 is presented in **Table 1**. Daubenmire survey results at this location show that Sandberg's bluegrass (*Poa secunda*) had the highest percentage of canopy cover, species composition, and frequency at this location. Cheatgrass and bur buttercup (*Ceratocephala testiculata*) also occurred at a high frequency within the 50 surveyed quadrats. **Photo 2** and **Photo 3** show the Daubenmire survey completed at this location and the completed survey form is included in **Appendix B**.

Table 1. Daubenmire #1-2015 Sagebrush/Bunchgrass Community

Coordinates: 117.365E, 43.671N BLM land in Grassy Mountain Project Area		**Investigator:** R. Waldher **Date:** April 8, 2015	
Plant Species	**Percent Canopy Cover**	**Species Composition**	**Frequency**
ARTR – Artemisia tridentata	5	11	14
CHVI – Chrysothamnus nauseosus	-	-	2
POSE – Poa secunda	21	45	82
AGSP – Agropyron spicatum	5	11	20
CETE – Ceratocephala testiculata	6	13	54
BRTE – Bromus tectorum	10	21	60

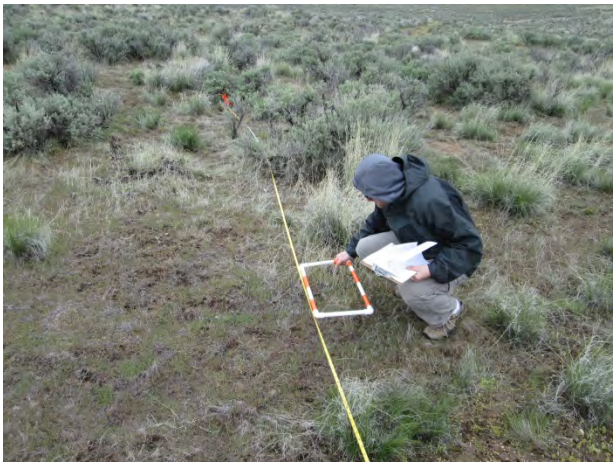
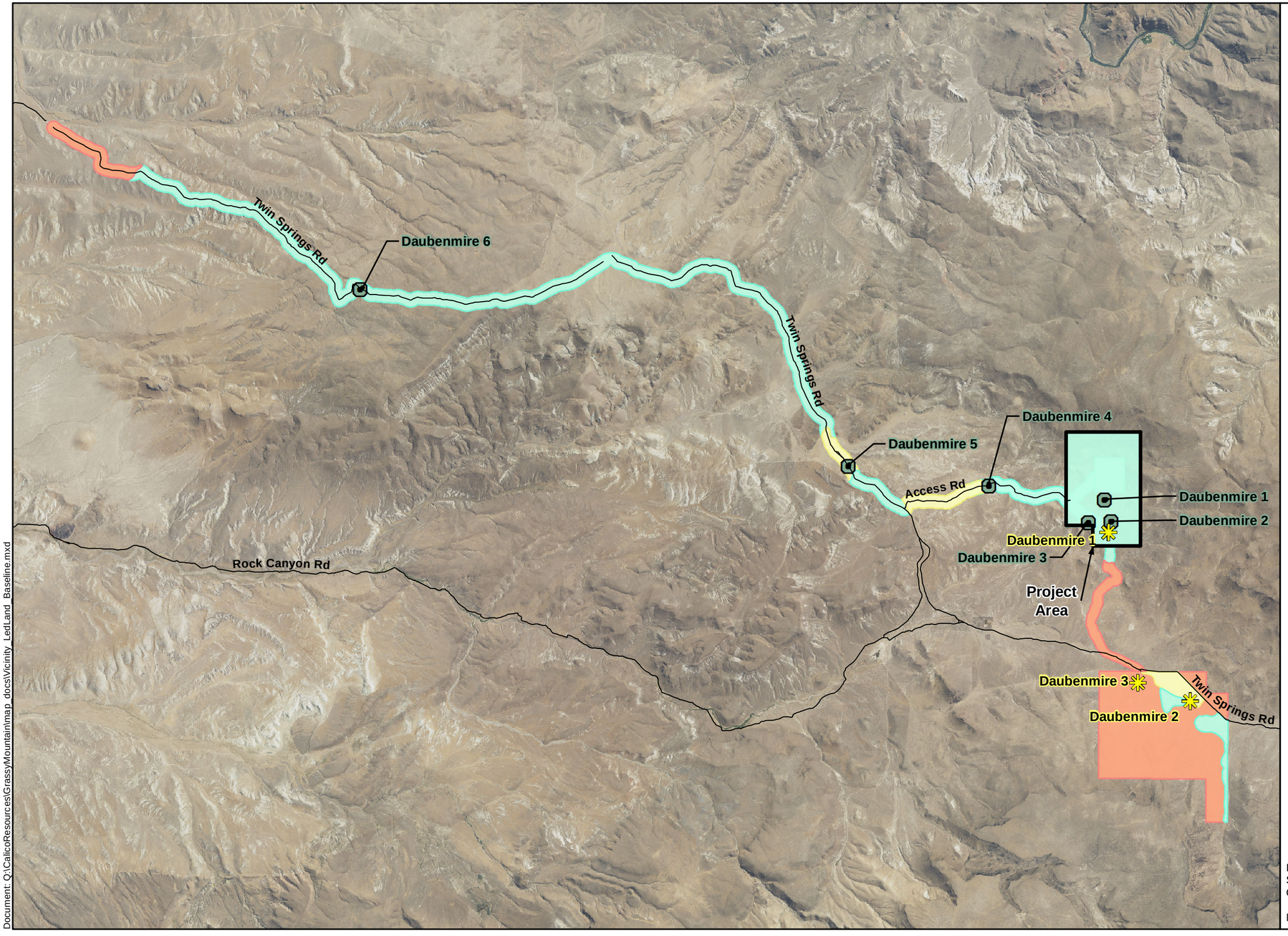


Photo 2. Using the Daubenmire frame placed along a 100-foot-long measuring tape, HDR measured 50 quadrats.

Photo 3. Daubenmire #1 was located on BLM land in the Grassy Mountain Project Area within the sagebrush/bunchgrass plant community.



Legend

- Project Area
- Public Roads
- Additional Daubenmire Transect Location
- Previously Reported Daubenmire Transect Location

Plant Community Type

- Annual Grass
- Crested Wheatgrass / Annual Grass
- Sagebrush / Bunchgrass

Note: Northern extent of plant community types is the limits of BLM ownership.

0 6,000 12,000
Feet

Imagery: 2014 NAIP 1 meter resolution
Source: NRCS/USDA Digital Gateway
Other Data Sources: BLM, USGS, Malheur County

Map Production Date: 7/29/2015

Document: Q:\CalicoResources\GrassyMountain\map_docs\Vicinity_LedLand_Baseline.mxd

Figure 4. Vegetation Community Types
Calico Resources, Grassy Mountain Project
Malheur County, OR

2.2.2 Daubenmire #2-2015 – Sagebrush/Bunchgrass Community

HDR's survey team performed a Daubenmire vegetation survey at 117.370E, 43.670N, located in Section 7, Township 22 South, Range 44 East (**Figure 4**). The sampling plot is located on BLM land in the Project area within the sagebrush/bunchgrass vegetation community. Information for Daubenmire #2-2015 is presented in **Table 2**. Daubenmire survey results at this location show that Sandberg's bluegrass had the highest percentage of canopy cover, species composition, and frequency at this location. Cheatgrass also occurred at a high frequency within the 50 surveyed quadrats. **Photo 4** and **Photo 5** show the Daubenmire survey completed at this location and the completed survey form is included in **Appendix B**.

Table 2. Daubenmire #2-2015 Sagebrush/Bunchgrass Community

Coordinates: 117.370E, 43.670N BLM land in Grassy Mountain Project Area		**Investigator:** R. Waldher **Date:** April 8, 2015	
Plant Species	**Percent Canopy Cover**	**Species Composition**	**Frequency**
ARTR – Artemisia tridentata	5	10	18
CHVI – Chrysothamnus nauseosus	1	2	6
POSE – Poa secunda	19	40	100
AGSP – Agropyron spicatum	12	25	46
BRTE – Bromus tectorum	11	23	94

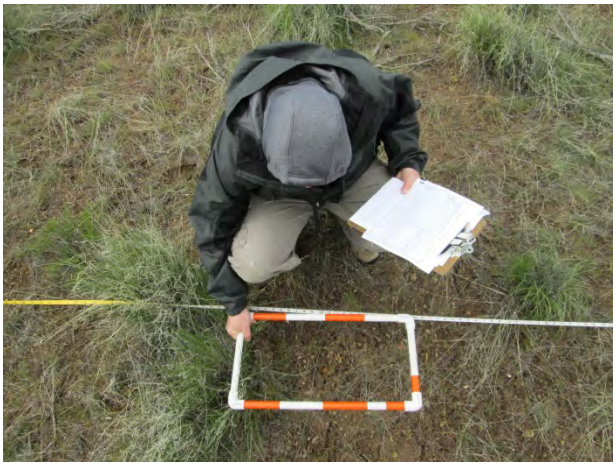


Photo 4. Daubenmire results confirmed that bunchgrasses were common at this location.

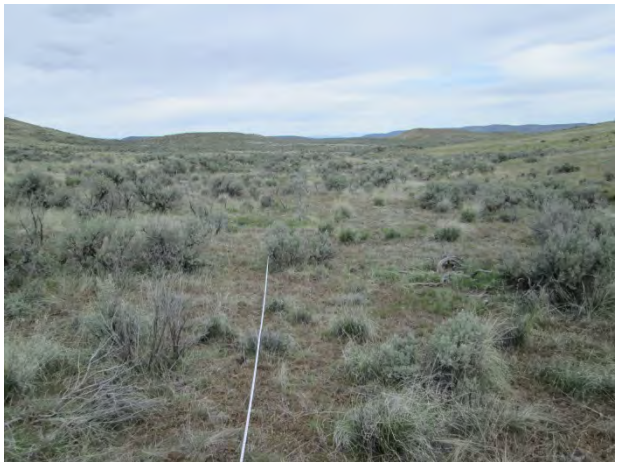


Photo 5. Daubenmire #2 was located on BLM land in the Grassy Mountain Project Area within the sagebrush/bunchgrass plant community.

2.2.3 Daubenmire #3-2015 – Sagebrush/Bunchgrass Community

HDR's survey team performed a Daubenmire vegetation survey at 117.370E, 43.673N, located in Section 7, Township 22 South, Range 44 East (**Figure 4**). The sampling plot is located on BLM land within the sagebrush/bunchgrass vegetation community. Information for Daubenmire #3-2015 is presented in **Table 3**. Daubenmire survey results at this location show that cheatgrass had the highest percentage of canopy cover, species composition, and frequency at this location. **Photo 6** and **Photo 7** show the Daubenmire survey completed at this location and the completed survey form is included in **Appendix B**.

Table 3. Daubenmire #3-2015 Sagebrush/Bunchgrass Community

Coordinates: 117.370E, 43.673N BLM land		**Investigator:** R. Waldher **Date:** April 8, 2015	
Plant Species	**Percent Canopy Cover**	**Species Composition**	**Frequency**
ARTR – Artemisia tridentata	14	26	38
AGSP – Agropyron spicatum	3	6	12
POSE – Poa secunda	5	9	54
BRTE – Bromus tectorum	31	58	88

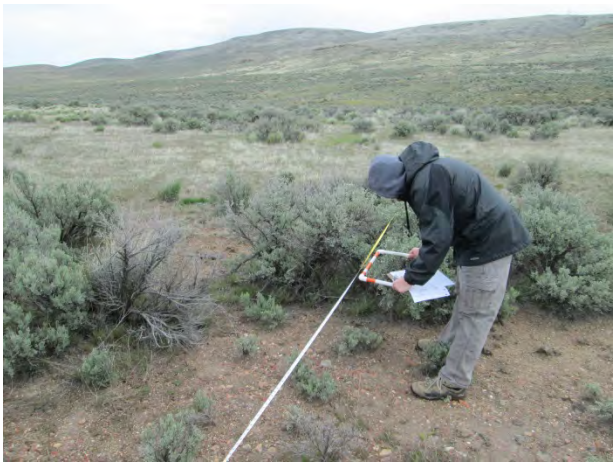


Photo 6. Using the Daubenmire frame placed along a 100-foot-long measuring tape, HDR measured 50 quadrats.

Photo 7. Daubenmire #3 was located on BLM land in the Grassy Mountain Project Area within the sagebrush/bunchgrass plant community.

2.2.4 Daubenmire #4-2015 – Sagebrush/Bunchgrass Community

HDR's survey team performed a Daubenmire vegetation survey at 117.362E, 43.690N, located in Section 5, Township 22 South, Range 44 East (**Figure 4**). The sampling plot is located on BLM land, adjacent to the access road, within the sagebrush/bunchgrass vegetation community. Information for Daubenmire #4-2015 is presented in **Table 4**. Daubenmire survey results at this location show that big sagebrush (*Artemisia tridentata*) had the highest percentage of canopy cover and species composition at this location. Bur buttercup occurred at the highest frequency as it was present within each of the 50 surveyed quadrats. **Photo 8** and **Photo 9** show the Daubenmire survey completed at this location and the completed survey form is included in **Appendix B**.

Table 4. Daubenmire #4-2015 Sagebrush/Bunchgrass Community

Coordinates: 117.362E, 43.690N BLM land adjacent to access road		**Investigator:** R. Waldher **Date:** April 16, 2015	
Plant Species	**Percent Canopy Cover**	**Species Composition**	**Frequency**
ARTR – Artemisia tridentata	18	47	46
POSE – Poa secunda	10	26	66
AGSP – Agropyron spicatum	2	5	16
CETE – Ceratocephala testiculata	8	21	100

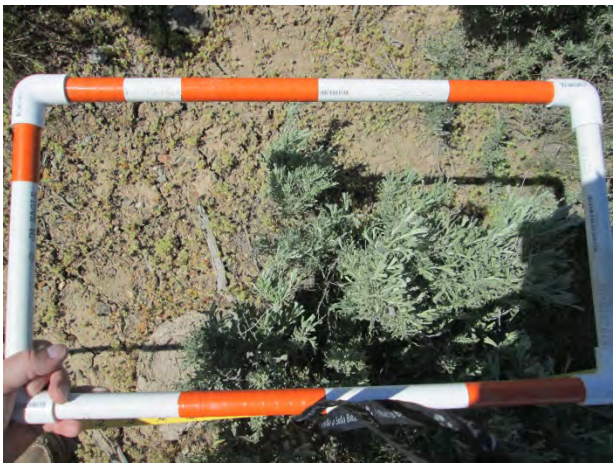


Photo 8. Sagebrush cover shown within Daubenmire frame.

Photo 9. Daubenmire #4 was located approximately 20 feet from the proposed access road within the sagebrush/bunchgrass plant community.

2.2.5 Daubenmire #5-2015 – Crested Wheatgrass/Annual Grass Community

HDR's survey team performed a Daubenmire vegetation survey at 117.357E, 43.714N, located in Section 29, Township 21 South, Range 44 East (**Figure 4**). The sampling plot is located on BLM land, approximately 20 feet from Twin Springs Road, within the crested wheatgrass/annual grass vegetation community. Information for Daubenmire #5-2015 is presented in **Table 5**. Daubenmire survey results at this location show that crested wheatgrass (*Agropyron cristatum*) had the highest percentage of canopy cover and species composition. Cheatgrass and crested wheatgrass both occurred at a high frequency within the 50 surveyed quadrats. **Photo 10** and **Photo 11** show the Daubenmire survey completed at this location and the completed survey form is included in **Appendix B**.

Table 5. Daubenmire #5-2015 Crested Wheatgrass Annual Grass Community

Coordinates: 117.357E, 43.714N BLM land, 20 feet from Twin Springs Road		**Investigator:** R. Waldher **Date:** April 16, 2015	
Plant Species	**Percent Canopy Cover**	**Species Composition**	**Frequency**
AGCR – Agropyron cristatum	23	66	78
CHVI – Chrysothamnus nauseosus	-	-	6
POSE – Poa secunda	2	5	26
BRTE – Bromus tectorum	11	22	88

Photo 10. Using the Daubenmire frame placed along a 100-foot-long measuring tape, HDR measured 50 quadrats.

Photo 11. Daubenmire #5 was located on BLM land approximately 20 feet from Twin Springs Road within the crested wheatgrass/annual grass plant community.

2.2.6 Daubenmire #6-2015 – Sagebrush/Bunchgrass Community

HDR's survey team performed a Daubenmire vegetation survey at 117.317E, 43.797N, located in Section 27, Township 20 South, Range 44 East (**Figure 4**). The sampling plot is located on BLM land, approximately 15 feet from Twin Springs Road, within the sagebrush/bunchgrass vegetation community. Information for Daubenmire #6-2015 is presented in **Table 6**. Daubenmire survey results at this location show that big sagebrush had the highest percentage of canopy cover and species composition at this location. Cheatgrass occurred at the highest frequency within the 50 surveyed quadrats. **Photo 12** and **Photo 13** show the Daubenmire survey completed at this location and the completed survey form is included in **Appendix B**.

Table 6. Daubenmire #6-2015 Sagebrush/Bunchgrass Community

Coordinates: 117.317E, 43.797N BLM land, 15 feet from Twin Springs Road		**Investigator:** R. Waldher **Date:** April 16, 2015	
Plant Species	**Percent Canopy Cover**	**Species Composition**	**Frequency**
ARTR – Artemisia tridentata	16	42	62
CHVI – Chrysothamnus nauseosus	-	-	4
POSE – Poa secunda	15	39	92
LUSP. – Lupinus sp.	1	2	8
BRTE – Bromus tectorum	6	16	74

Photo 12. Lupine was observed within several quadrats at this location.

Photo 13. Daubenmire #6 was located on BLM land approximately 15 feet from Twin Springs Road within the crested wheatgrass/annual grass plant community.

2.3 Summary

This addendum updates the *Draft Terrestrial Vegetation Baseline Study* (HDR 2014). Vegetation within the study area is a desert-rangeland type where sagebrush and grasses are the dominant species. The area has been extensively grazed for a number of years. Portions of the study area appear to have been re-seeded at one time with a crested wheatgrass (*Agropyron cristatum*) dominated seed mix.

The survey team used the Daubenmire vegetation sampling method for sampling vegetation attributes at six locations. HDR recorded the information collected in the field on standardized Daubenmire field forms, which are included in **Appendix B**. The survey results confirmed the presence of three main vegetation community types within the study area: sagebrush/bunchgrass, crested wheatgrass/annual grass, and annual grass. Cheatgrass (*Bromus tectorum*), an invasive annual species, was common in nearly every plant community.

During the spring 2015 vegetation surveys, HDR's survey team did not observe any TES species, Oregon and BLM sensitive species, or noxious weeds within the six Daubenmire transects they surveyed. They did observe cattle and sheep grazing at several locations within the study area. Most grass species were fully emerged and spring flowering forb species were in peak bloom.

Section 3: Bibliography

Daubenmire, Rexford. 1959*. A Canopy Coverage Method of Vegetational Analysis. Northwest Science.*

HDR, Inc. (HDR)

2013. *Final Revised Environmental Baseline Study Work Plans*. March.

2014. *Draft Terrestrial Vegetation Baseline Study*. November.

Section 4: Contacts

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Boise, ID 83706-6659
208-387-7067
christine.whittaker@hdrinc.com

A

Vegetation Species Observed

Appendix A Grassy Mountain Exploration Project Terrestrial Vegetation Report – Vegetation Species Observed			
Scientific Name	**Common Name**	**Family Name**	**Plant Description**
Shrubs (Shrub Stratum)			
Artemisia tridentata	big sagebrush	Asteraceae	Perennial shrub
Chrysothamnus nauseosus	rubber rabbitbrush	Asteraceae	Perennial shrub
Chrysothamnus viscidiflorus	green rabbitbrush	Asteraceae	Perennial shrub
Opuntia polyacantha	plains prickly pear	Cactaceae	Perennial shrub
Rosa woodsii	Wood's rose	Rosaceae	Perennial shrub
Sarcobatus vermiculatus	greasewood	Chenopodiaceae	Perennial shrub
Forbs (Herbaceous Stratum)			
Achillea millefolium	common yarrow	Asteraceae	Perennial forb
Arnica sp.	Arnica	Asteraceae	Perennial forb
Balsamorhiza sagittata	arrowleaf balsamroot	Asteraceae	Perennial forb
Ceratocephala testiculata	bur buttercup	Ranunculaceae	Annual forb
Chorispora tenella	blue mustard	Brassicaceae	Annual forb
Cirsium arvense	Canada thistle	Asteraceae	Noxious weed
Cirsium undulatum	wavyleaf thistle	Asteraceae	Perennial forb
Convolvulus arvensis	field bindweed	Convolvulaceae	Perennial forb
Eriogonum spergulinum	buckwheat	Polygonaceae	Annual forb
Haplopappus carthamoides	large-flowered goldenweed	Asteraceae	Perennial forb
Kochia scoparia	kochia	Chenopodiaceae	Annual forb
Lepidium perfoliatum	pepperweed	Brassicaceae	Annual/biennial forb
Lomatium simplex	desert parsley	Apiaceae	Perennial forb
Lupinus sp.	lupine	Leguminaceae	Perennial forb
Melilotus alba	white sweet clover	Leguminaceae	Perennial forb
Melilotus officinalis	yellow sweet clover	Leguminaceae	Perennial forb
Phlox sp.	Phlox	Polemoniaceae	Perennial forb
Rumex crispus	curly dock	Polygonaceae	Perennial forb
Sisymbrium altissimum	tumble mustard	Brassicaceae	Annual/biennial forb
Sphaeralcea munroana	Munro's gobemallow	Malvaceae	Perennial forb
Sphaerophysa salusula	Austrian peaweed	Fabaceae	Noxious weed
Taraxacum officinale	common dandelion	Compositaceae	Perennial forb
Tragopogon dubius	salsify	Asteraceae	Annual/biennial forb
Verbascum blattaria	moth mullein	Scrophulariaceae	Biennial forb
Grass and Grasslikes (Herbaceous Stratum)			
Agropyron cristatum	crested wheatgrass	Poaceae	Perennial grass
Agropyron spicatum	bluebunch wheatgrass	Poaceae	Perennial grass
Bromus tectorum	cheat grass	Poaceae	Annual grass
Eleocharis sp.	spikerush	Cyperaceae	Native grasslike
Elymus caput-medusae	medusahead	Poaceae	Annual grass
Elymus elymoides	squirreltail	Poaceae	Perennial grass
Hordeum jubatum	foxtail barley	Poaceae	Perennial grass
Juncus sp.	rush species	Juncaceae	Native grasslike
Leymus cinereus	Great Basin wildrye	Poaceae	Perennial grass
Poa secunda	Sandberg's bluegrass	Poaceae	Perennial grass
Polypogon monspeliensis	rabbit's foot grass	Poaceae	Annual grass
Vulpia microstachys	small fescue	Poaceae	Annual grass

B

Vegetation Field Sampling Forms

ADDENDUM #1

Daubenmire

Study Number BASELINE VEG.	Date 4/8/15	Examiner R. WALDHER	Allotment Name & Number	Pasture
Transect Number and Location Daubenmire #1 - 2015			Number of Quadrats 50	

Plant Species	Quadrat																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
ARTR																1								3	3
CHVI		2																							
POSE	2	2	2	4	4	4	3	5	3	2	3	1	1		2		5	2	4	3	2	2	1	1	3
AGSP													3					2					1		
CETE		1							1	1	1	1	1	1	1		1	1	1	1	1	2	1		1
BRTE									1	1			1	4	4	3	1	1						2	

Plant Species	Quadrat																								
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
ARTR																				5	4	2			1
CHVI																									
POSE	3	2		3	3	2	3	2	2	1				1	1			2	1		1	3	1	2	2
AGSP												3	3		4		1	4						1	1
CETE			1	2	2	2					1	2	2	1		5	5								1
BRTE	3	3	2	1	1	1	1	2	2	3	2			1	1			2	1	2	2	3	3	1	1

Illustration 9

Daubenmire Summary

Study Number BASELINE VEG.	Date 4/8/15	Examiner R. WALDHER	Allotment Name & Number	Pasture
Study Location Daubenmire #1 - 2015			Number of Quadrats 50	

Cover Class	Mid-Point	Species ARTR		Species CHVI		Species POSE		Species AGSP		Species CETE		Species BRTE		Species		Species		Species		Species		Species	
		Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product
1 1-5%	2.5	2	5	-	-	10	25	4	10	19	47.5	14	35										
2 5-25%	15	1	15	1	15	15	225	1	15	6	90	8	120										
3 26-50%	37.5	2	73	-	-	10	375	3	112.5	-	-	6	225										
4 51-75%	62.5	1	62.5	-	-	4	250	2	125	-	-	2	125										
5 76-95%	85	1	85	-	-	2	170	-	-	2	170	-	-										
6 96-100%	97.5	-	-	-	-	-	-	-	-	-	-	-	-										
Total canopy			240.5		15		1045		262.5		307.5		505										
Number of Samples			50		50		50		50		50		50										
% canopy cover			5		-		21		5		6		10										
Species composition			11		-		45		11		13		21										
Frequency			14		2		82		20		54		60										

ADDENDUM #1

Daubenmire

Study Number BASELINE VEG	Date 4/8/15	Examiner R. WALDHER	Allotment Name & Number	Pasture

Transect Number and Location Daubenmire #2 - 2015 | Number of Quadrats 50

Plant Species	Quadrat																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
ARTR	1	2	5	1	1	1																			
CHVI				2						3								2							
POSE	2	2	2	1	1	1	2	3	3	1	1	1	3	3	3	2	2	1	2	3	2	2	2	2	2
AGSP						3					2	2					3				3		4	2	1
BRTE	1		1	1			2	2	3	1	1	2	3	3	3	1	1	1	2	3	2	2	2	2	2

Plant Species	Quadrat																								
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
ARTR																					2	5	3		
CHVI																									
POSE	2	1	2	2	3	2	3	3	2	3	1	2	2	3	1	2	3	2	4	3	1	1	3	1	2
AGSP	4		2	2	1	2		3	3		4					1	3	3	1		1	1		3	
BRTE	1	2	3	3	1	1	1	1	1	1	1	1	1	2	2	2	1	1	1	1	1	1	2	1	1

Illustration 9

Daubenmire Summary

Study Number	Date	Examiner	Allotment Name & Number	Pasture
BASELINE VEG.	4/8/15	R. WALDHER		

Study Location	Number of Quadrats
Daubenmire #2 - 2015	50

Cover Class	Mid-Point	Species ARTR Number	ARTR Product	Species CHVI Number	CHVI Product	Species POSE Number	POSE Product	Species AGSP Number	AGSP Product	Species BRTE Number	BRTE Product	Species Number	Species Product	Species Number	Species Product	Species Number	Species Product	Species Number	Species Product	Species Number	Species Product	Species Number	Species Product
1 1-5%	2.5	4	10	-	-	13	32.5	6	15	26	65												
2 5-25%	15	2	30	2	30	22	330	6	90	14	210												
3 26-50%	37.5	1	37.5	1	37.5	14	525	8	300	7	262.5												
4 51-75%	62.5	-	-	-	-	1	62.5	3	187.5	-	-												
5 76-95%	85	2	170	-	-	-	-	-	-	-	-												
6 96-100%	97.5	-	-	-	-	-	-	-	-	-	-												
Total canopy			247.5		67.5		950		592.5		537.5												
Number of Samples			50		50		50		50		50												
% canopy cover			5		1		19		12		11												
Species composition			10		2		40		25		23												
Frequency			18		6		100		46		94												

Illustration 10

ADDENDUM # 1

Daubenmire

Page 1 of 2

Study Number BASELINE VEG.	Date 4/8/15	Examiner R. WALDHER	Allotment Name & Number	Pasture
Transect Number and Location Daubenmire # 3 - 2015			Number of Quadrats 50	

Plant Species	Quadrat																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
ARTR								2	1	3	3														3
AGSP																									
POSE	1	2				1	1		2	2		1			1	1				1				2	1
BRTR	4	3	4	4	4	4	4	3	3	2	1	1	3	4	4	4	4	4	3	2	4	4	4	3	2

Plant Species	Quadrat																								
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
ARTR	3	2					3	3	4		2	2	2	5	5	3	3	1	4						
AGSP	1	3		3		3	1	3																	
POSE	1				1	1	3		1						1	3	2	1	2	3	2	1	1	2	
BRTR	1	2					1		2	1	1	1		2	1	2	2	1	1	2	3	4	4	4	4

Illustration 9

ADDENDUM #1

Daubenmire Summary

Study Number	Date	Examiner	Allotment Name & Number	Pasture
BASELINE VEG.	4/8/15	R. WALDHER		

Study Location: Daubenmire #3 - 2015 | Number of Quadrats: 50

Cover Class	Mid-Point	Species: ARTR Number	ARTR Product	Species: AGSP Number	AGSP Product	Species: POSE Number	POSE Product	Species: BRTE Number	BRTE Product	Species Number	Species Product	Species Number	Species Product	Species Number	Species Product	Species Number	Species Product	Species Number	Species Product	Species Number	Species Product	Species Number	Species Product
1 1-5%	2.5	2	5	2	5	16	40	10	25														
2 5-25%	15	5	75	-	-	8	120	9	135														
3 26-50%	37.5	8	300	4	150	3	112.5	7	262.5														
4 51-75%	62.5	2	125	-	-	-	-	18	1125														
5 76-95%	85	2	170	-	-	-	-	-	-														
6 96-100%	97.5	-	-	-	-	-	-	-	-														
Total canopy			675		155		272.5		1547.5														
Number of Samples			50		50		50		50														
% canopy cover			14		3		5		31														
Species composition			26		6		9		58														
Frequency			38		12		54		88														

ADDENDUM #1

Daubenmire

Study Number BASELINE VEG.	Date 4/16/15	Examiner R. WALDHER	Allotment Name & Number	Pasture

Transect Number and Location Daubenmire #4 - 2015 | Number of Quadrats 50

Plant Species	Quadrat																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
ARTR					2				2		4	2	1	5	4					5	3	2			
POSE	2	1	1	4	1		2	3	2	1	3	1	2	2	3			2	3	2	2			1	2
AGSP						1	2				1				1										
CETE	1	1	1	1	1	3	2	1	1	1	1	2	1	1	1	1	1	2	1	1	1	1	1	1	2

Plant Species	Quadrat																								
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
ARTR	3		3	5		3	3	3	4	3	3				3				4				2	1	
POSE	3					1	2	2	2	1	1	1		2	2			1				2		1	2
AGSP								1		3	2					1			1						
CETE	1	1	1	1	3	2	3	1	1	1	1	1	1	1	1	1	1	1	1	3	3	3	2	1	1

Illustration 9

ADDENDUM #1

Daubenmire Summary

Study Number	Date	Examiner	Allotment Name & Number	Pasture
BASELINE VEG.	4/16/15	R. WALDHER		

Study Location: Daubenmire #4 - 2015 | Number of Quadrats: 50

Cover Class	Mid-Point	Species: ARTR		Species: POSE		Species: AGSP		Species: CETE		Species		Species		Species		Species		Species		Species		Species	
		Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product
1 1-5%	2.5	2	5	12	30	5	12.5	38	95														
2 5-25%	15	5	75	15	225	2	30	6	90														
3 26-50%	37.5	9	337.5	5	187.5	1	37.5	6	225														
4 51-75%	62.5	4	250	1	62.5	-	-	-	-														
5 76-95%	85	3	255	-	-	-	-	-	-														
6 96-100%	97.5	-	-	-	-	-	-	-	-														
Total canopy			922.5		505		80		410														
Number of Samples			50		50		50		50														
% canopy cover			18		10		2		8														
Species composition			47		26		5		21														
Frequency			46		66		16		100														

Illustration 10

ADDENDUM #1

Daubenmire

Study Number BASELINE VEG.	Date 4/16/15	Examiner R. WALDHER	Allotment Name & Number	Pasture

Transect Number and Location Daubenmire #5 - 2015 | Number of Quadrats 50

Plant Species	Quadrat																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
AGCR	1	4	2	3	1	1	2		1	3	2	4					3	3		5	3	3	4		2
CHVI																									
POSE						1					1	1						1			1				
BRTE	2	1	2	2	3	2	2	1	1	2	2	3	1	2	2	2	1	2	1		1	2	2	1	2

Plant Species	Quadrat																								
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
AGCR	2	2	2	3		2	2	4	4	1	1		1	1		1	3		4	3	3	4	2	3	3
CHVI													2	1		1									
POSE						1								3	1			1		1	1			2	2
BRTE	2	1		1	2	1	3	2	1		1	1	1	1	2	3	3	1			1	1	2	2	2

Illustration 9

ADDENDUM # 1

Daubenmire Summary

Study Number BASELINE VEG.	Date 4/16/15	Examiner R. WALDHER	Allotment Name & Number	Pasture
Study Location Daubenmire # 5-2015			Number of Quadrats 50	

Cover Class	Mid-Point	Species AGCR Number	AGCR Product	Species CHVI Number	CHVI Product	Species POSE Number	POSE Product	Species BRTE Number	BRTE Product	Species Number	Species Product	Species Number	Species Product	Species Number	Species Product	Species Number	Species Product	Species Number	Species Product	Species Number	Species Product	Species Number	Species Product
1 1-5%	2.5	9	22.5	2	5	10	25	19	47.5														
2 5-25%	15	10	150	1	15	2	30	20	300														
3 26-50%	37.5	12	450	-	-	1	37.5	5	187.5														
4 51-75%	62.5	7	437.5	-	-	-	-	-	-														
5 76-95%	85	1	85	-	-	-	-	-	-														
6 96-100%	97.5	-	-	-	-	-	-	-	-														
Total canopy			1145		20		92.5		535														
Number of Samples			50		50		50		50														
% canopy cover			23		-		2		11														
Species composition			66		0		5		22														
Frequency			78		6		26		88														

ADDENDUM #1

Daubenmire

Study Number	Date	Examiner	Allotment Name & Number	Pasture
BASELINE VEG	4/16/15	R. WALDHER		

Transect Number and Location: Daubenmire # 6 - 2015

Number of Quadrats: 50

Plant Species	Quadrat																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
ARTR	3			2	4	1			1	2	3	2							5	4	1	1	4	3	2
CHVI																									
POSE	2	1	3	2	3	3	2	2	1	2	3	2	2	2	2	4	3	2	2	1	2		1	2	2
LUSP.																								1	1
BRTE	2	1	1			1	2	2			2	2	1			1	2	1	1	1		3	1	1	1

Plant Species	Quadrat																								
	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
ARTR				1							2	3	1	2	4	2	1	1	1	1	2	3	4	3	3
CHVI																		1	1						
POSE	1	3	2	2	3	2	1	1	2		1		2	1	3	1	1		2	1	2	1	2	2	1
LUSP.	1															4									
BRTE	1			1	2		1	1		1	1	3	2	1	2	1		1		1	1	3	2	1	1

Illustration 9

ADDENDUM #1

Daubenmire Summary

Study Number	Date	Examiner	Allotment Name & Number	Pasture
BASELINE VEG	4/16/15	R. WALDHER		

Study Location: Daubemire #6 - 2015 | Number of Quadrats: 50

Cover Class	Mid-Point	Species: ARTR		Species: CHVI		Species: POSE		Species: LUSP.		Species: BRTE		Species		Species		Species		Species		Species		Species	
		Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product	Number	Product
1 1-5%	2.5	10	25	2	5	14	35	3	7.5	24	60												
2 5-25%	15	8	120	-	-	23	345	-	-	10	150												
3 26-50%	37.5	7	262.5	-	-	8	300	-	-	3	112.5												
4 51-75%	62.5	5	312.5	-	-	1	62.5	1	62.5	-	-												
5 76-95%	85	1	85	-	-	-	-	-	-	-	-												
6 96-100%	97.5	-	-	-	-	-	-	-	-	-	-												
Total canopy			805		5		742.5		70		322.5												
Number of Samples			50		50		50		50		50												
% canopy cover			16		-		15		1		6												
Species composition			42		-		39		2		16												
Frequency			62		4		92		8		74												

ATTACHMENT B

SAGEBRUSH IDENTIFICATION TEST FOR THE GRASSY MOUNTAIN MINE PROJECT; MALHEUR COUNTY, OREGON
MEMO FROM EM STRATEGIES TO DOGAMI, DATED OCTOBER 2, 2018.

EM STRATEGIES

MEMORANDUM

DATE: October 2, 2018

TO: Randy Jones, Oregon Department of Geology and Mineral Industries

FROM: Kris Kuyper, Biology Program Manager; Sarah Harrelson, Botanist

SUBJECT: Sagebrush Identification Test for the Grassy Mountain Mine Project; Malheur County, Oregon

INTRODUCTION

Calico Resources USA Corp. (Calico) received a letter dated August 10, 2018, with comments on the *Grassy Mountain Mine Project Terrestrial Vegetation Baseline Report* (EM Strategies, Inc. [EMS] 2018) from the Oregon Department of Geology and Mineral Industries (DOGAMI). The DOGAMI comment letter included reviews by DOGAMI, the Oregon Department of Agriculture, and the Oregon Department of Fish and Wildlife (ODFW). The ODFW stated "the identification of the dominant big sage subspecies as mountain [big sagebrush] ([*Artemisia tridentata* subsp.] *vaseyana*) instead of Wyoming [big sagebrush] ([*A. t.* subsp] *wyomingensis*) seems odd at that elevation. Because the baseline data could be used to inform reclamation seed mixes and to evaluate reclamation success, this identification should be verified." To accommodate this comment, Calico tasked SPF Water Engineering, LLC (SPF) with the field collection of sagebrush plant samples to be sent to EMS for testing. The methodology and results of the tests are provided below.

METHODOLOGY

SPF collected the samples on September 18, 2018. The samples were collected from two locations, identified as Daubenmire plots D4 and D7 in the baseline report. The samples were packaged in two separate plastic bags and were sent via overnight mail. The samples were received by EMS on September 19, 2018. The identification process followed the method outlined in the United States Forest Service's (USFS') 2015 *Sagebrush Identification with Ultraviolet Light* (Attachment 1). The use of distilled water rather than using both methanol and water was the only modification to this specific methodology. The USFS *Sagebrush Identification Table for Use with Black Light* (Attachment 2) listed identification factors for using water or methanol. Other references that state water is an acceptable method for testing include: *A Simple Field Technique for Identification of Some Sagebrush Taxa* (Stevens and McArthur 1974); Sagebrush Identification, Ecology, and Palatability Relative to Sage-Grouse (Rosentreter 2004); and *Pocket Guide to Sagebrush* (PRBO Conservation Science 2012).

Small amounts (at least two cubic centimeters) of plant material from each location were placed in two separate small jars, which were then filled with just enough distilled water to cover the plant

material. An effort was made to avoid cross-contamination of samples by washing the scissors used between maceration of each sample. The samples were then allowed to rest for approximately 15 minutes.

Once the samples were allowed to rest, they were taken into a dark room and lit with a 365-nanometer ultraviolet (UV) light.

RESULTS

Results were based on the USFS *Sagebrush Identification Table for Use with Black Light* (Attachment 2). The table states that samples identified as Wyoming big sagebrush must have at least three of the following characteristics to make a definitive identification:

1. UV fluorescence in water (colorless to very very pale blue);
2. Leaf shape and size (leaves ½ to ¾ inch long; leaf margins curved outward; crushed leaves have a turpentine smell);
3. Plant growth form (uneven topped; floral stems growing throughout the crown);
4. Branching pattern (spreading/upright);
5. Environment (mesic to frigid; xeric to ustic; 4,500 feet to 5,500 feet above mean sea level [amsl]); and
6. Mature plant height (up to four feet).

Samples identified as mountain big sagebrush must have at least three of the following characteristics to make a definitive identification:

1. UV fluorescence in water (intense blue to creamy-blue);
2. Leaf shape and size (leaves ¾ to one-inch long; leaf margins curved outward; crushed leaves have a mint-ish smell);
3. Plant growth form (even);
4. Branching pattern (spreading/somewhat upright);
5. Environment (frigid; xeric to ustic; 5,200 feet to 8,600 feet amsl; can rarely be mesic); and
6. Mature plant height (up to four feet).

The sample from the D4 location fluoresced colorless to very very pale blue under UV light, had leaves that were approximately 0.5-inch long with turpentine smell, and the specimen was collected at approximately 3,670 feet amsl. The specimen from the D7 location fluoresced colorless to very very pale blue under UV light, had leaves that were approximately 0.5 to 0.75-inch long with turpentine smell, and was collected at approximately 3,520 feet amsl.

CONCLUSION

Both samples demonstrated the characteristics of Wyoming big sagebrush; specifically, UV fluorescence, leaf shape, size, and smell. In addition, the elevation at which the samples were collected are closer to the elevation range reported for Wyoming big sagebrush than mountain big sagebrush. Therefore, the specimens at both the D4 and D7 sample sites are determined to be Wyoming big sagebrush.

ATTACHMENTS

Attachment 1: Sagebrush Identification with Ultraviolet Light
Attachment 2: Sagebrush Identification Table for Use with Black Light

REFERENCES

PRBO (Point Reyes Bird Observatory) Conservation Science. 2012. *Pocket Guide to Sagebrush*. http://www.sagestep.org/pubs/pubs/sagebrush_pock_guide.pdf. Accessed October 1, 2018.

Rosentreter, Roger. 2004. *Sagebrush Identification, Ecology, and Palatability Relative to Sage-Grouse*. USDA Forest Service Proceedings RMRS-P-000. https://www.ntc.blm.gov/krc/uploads/284/Sagebrush%20Identification%20Ecology%20and%20Palatability%20Relative%20to%20Sage%20Grouse..pdf. Accessed October 1, 2018.

Stevens, Richard and E. Durant McArthur. 1974. *A Simple Field Technique for Identification of Some Sagebrush Taxa*. Journal of Range Management 27(4). July 1974. https://journals.uair.arizona.edu/index.php/jrm/article/viewFile/6349/5959. Accessed October 1, 2018.

United States Forest Service (USFS). 2010. *Sagebrush Identification Table For Use With Black Light*. https://www.fs.fed.us/rm/boise/research/shrub/Links/SageID.pdf. Accessed September 20, 2018.

_____. 2015. *Sagebrush Identification with Ultraviolet Light*. https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3836539.pdf. Accessed September 20, 2018.

Sagebrush Identification with Ultraviolet Light

April 2015

Multiple vegetation keys exist to identify sagebrush taxa. A supplementary method to aid in accurate sagebrush identification is the ultraviolet (UV) light fluorescing technique. Using this method is optional for sagebrush identification, but may be used by Government inspectors for quality assurance purposes.

Materials needed:

- 100% methanol
- water
- small glass vials
- scissors
- 366 nm UV light

UV light fluorescing method:

1. Collect sagebrush specimen. If specimens are not tested immediately, store them in separate air-tight containers (e.g., zip-lock bags).
2. Within 3 days of specimen collection – cut up sagebrush leaves with scissors into two glass vials. Put at least 2 cubic centimeters of leaf material into each vial.
3. Add water to one vile and 100% methanol to the other, so that the leaves are submerged. Do not fill the entire vile with liquid.
4. Let the leaves sit in each solution for up to 15 minutes; in many cases fluorescence may be visible immediately.
5. In a darkened area, use a 366 nm UV light and shine through each vile.
6. Record color of the liquid fluorescing in each vile
7. Identify specimen by comparing fluorescing results and morphological characteristics to the 'Sagebrush Identification Table for Use with Black Light.'

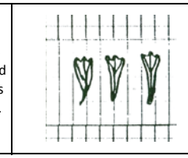
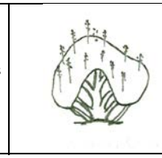
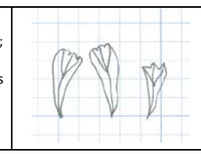
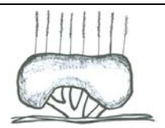
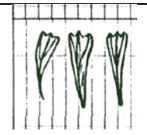
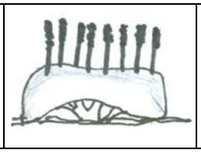
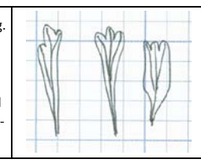
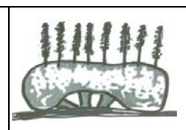
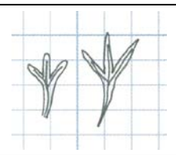
Sagebrush Identification with Ultraviolet Light Data Form

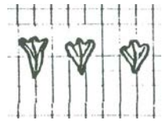
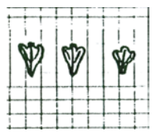
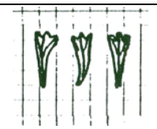
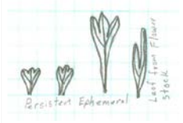
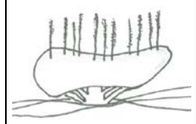
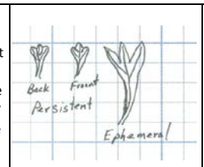
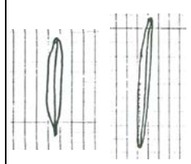
1- **Reference Site & Plot ID#:** _____ *2*- **Names**: _____ *3*- **M/D/YY:** _____-_____-_____

Specimen Number	Fluorescence Under UV Light		Morphological Characteristics	Identification
	Water	Methanol		

Sagebrush Identification Table For Use With Black Light

For Use in the Inter-Great Basin Area

Plant Nomenclature	Fluoresces Under Ultraviolet Light		Leaf shape and size		Plant Growth Form			Branching Pattern	Environment	Mature Plant Height	Comments
	Water	Alcohol									
Basin Big Sagebrush Artemisia tridentata subsp. tridentata (ARTRT)	Colorless to Very Very Pale blue Rarely pale Brownish-red	Brownish to Reddish-Brown to colorless	Leaves 3/4 -1 1/4 in. long; long narrow; Leaf will normally be 4 times longer than it is at its widest point; Leaf margins not extending outward; Crushed leaves have a strong turpentine smell			Uneven topped; Floral stems growing throughout the crown			"V"ed branching/ upright	Mesic to Frigid Xeric to Ustic 4000 to 8000 ft.	3.5 ft. to greater than 8 ft.	Uneven topped; Main stem is undivided and trunk-like at base;. Located normally in drainage bottoms; Small concave areas and valley floors, but always on deep Non-saline Non-calcareous soils. Vegetative leader is greater than 1/2 the length of the flower stalk from the same single branch. In Basin there are two growth forms: One the Typical tall form (Diploid); Two a shorter form that looks similar to Wyoming sagebrush if you do not look for the trunk (around 1 inch or so); the branching pattern; and the seedhead to vegetative leader characteristics (Tetraploid).
Wyoming Big Sagebrush Artemisia tridentata subsp. wyomingensis (ARTRW8)	Colorless to Very Very Pale blue	Colorless to pale brownish-red	Leaves 1/2 - 3/4 inches long; Leaf margins curved outward. Crushed leaves have a turpentine smell.			Uneven topped; Floral stems growing throughout the crown			Spreading/ upright	Mesic to Frigid Xeric to Ustic 4500 to 5500 ft.	Up to 4 ft.	Uneven topped; Main stem is usually divided at ground level. Plants will often keep the last years seed stalks into the following fall. Located normally in the lower half of the upland and through-out the semi-desert zones. Soils can be mildly alkaline.
Bonneville Big Sagebrush Artemisia tridentata subsp. "X bonnevillensis"	Blue to Intense Blue can be a creamy-blue	Colorless to weak brownish-red	Leaves 1/2 - 2/3 in. long; Leaf margins curved outward. Crushed leaves have a weak mint-ish smell.			Uneven but with even seed heads			Spreading/ upright	Mesic to Frigid Xeric 5000 to 7000 ft.	Up to 4 ft.	Uneven topped; Flower stalks extending noticeably above the top of the plant; Main stem is usually divided at ground level; . Located normally in the upper half of the upland zones (Normally 12 inches effective precipitation and up).
Mountain Big Sagebrush Artemisia tridentata subsp. vaseyana (pauciflora) (ARTRV)	Intense blue to Creamy-blue	Creamy-blue	Leaves 3/4 - 1 in. long; Leaf margins curved outward; Crushed leaves have a mint-ish smell.			Even			Spreading/ some-what upright	Frigid Xeric to Ustic 5200 to 8600 ft. Can rarely be Mesic	Up to 4 ft.	Even topped; Flower stalks extending noticeably above the top of the plant; Main stem divided at ground level. There are two types of mountain big sagebrush. **Mountain sagebrush** is located in the mountain zone. Very rarely in the High Mountain Zone. Subsp. pauciflora (M**ountain sagebrush**) will not layer nor sprout and has **6** or less flowers per floret.
High Mt. Big Sagebrush Artemisia tridentata subsp. vaseyana (ARTRV)	Intense blue to Creamy-blue	Creamy-blue	Leaves 3/4 - 1 in. long; Leaf margins curved outward; Crushed leaves have a mint-ish smell.			Even			Spreading/ some-what upright	Frigid to Cryic Mainly Udic sometimes Xeric to Ustic 6000 to 9000 ft.	Up to 4 ft.	Even topped; Flower stalks extending noticeably above the top of the plant; Main stem divided at ground level. **High Mountain sagebrush** is located in the High Mountain Zone. Very rarely found in the Mountain Zone. Subsp. vaseyana (**High Mountain sagebrush)** will layer limitedly but never sprout and has **7** or more flowers per floret.
Subalpine Big Sagebrush Artemisia tridentata spiciformis (ARTRS2)	Intense blue to Creamy-blue	Creamy-blue	Leaves 1 to 1 1/2 in. long. Leaf margins curved outward; Ephemeral leaves sometimes have entire margins. Crushed leaves have a fresh mint-ish smell.			Even			Spreading; Layering and Sprouting	Cryic to rarely frigid Mainly Udic, rarely Xeric to Ustic 7500 to 9400 ft.	Up to 4 ft. Normally around 3 ft.	Raggedly even topped; Flower stalks extending noticeably above the top of the plant; Branches layer producing roots wherever branches contact the ground for any extended period of time. Main stem divided at ground level. Located in the high mountain zone. Found on clayey to silty-clay loam soils. Can back-cross with Silver sage causing production of some entire leaves. Plant will sprout from damaged crowns and bases of branches.
Three Tip Sagebrush Artemisia tripartita (ARTR4)	Blue to Pale Blue	Brownish-Red to Colorless	Leaves 1/2 - 1 in. long; Leaf very deeply lobed and have a feathery look. Crushed leaves have a weak mint-ish smell.			Uneven but can appear Even			Spreading Layering Stump and root sprouting	Mesic to Frigid Xeric 4800 to 7000 ft.	2 to 3 ft.	Plants spread by seeds; layering stump and root sprouts. Plants tend to grow in patches with older plants in the middle. Grows in moderately deep to deep soils and in gravelly to loamy soils. This plant will replace Bonneville sagebrush if the site burns often enough. This plant will at times have a seed head apperanc simular to Subalpine Big Sagebrush.
Bigelow Sagebrush Artemisia bigelovii (ARBI3)	Pale Cremish Blue to Pale blue to rarely colorless	Brownish-Red to Colorless (The Brownish-red color may have an interesting Yellowish cast)	Leaves are 0.6 to 1 in. long. Leaves are not bucktoothed but can appear to be on casual observation.			Even			Spreading	Mesic Aridic to Xeric 4200 to 5000 ft.	0.75 to 2.0 ft.	Readily identified by morphological characteristics and/or geographic location. Grows on shallow soils derived from limestone and sometimes sandstone

Plant Nomenclature	Fluoresces Under Ultraviolet Light		Leaf shape and size			Plant Growth Form			Branching Pattern	Environment	Mature Plant Height	Comments
	Water	Alcohol										
Black Sagebrush (Gray Leaf) Artemisia nova (ARNO4)	Colorless (Greenish) to Pale Blue	Brownish-Red	Leaves 3/8 to 1/2 in. long rarely slightly longer; having glandular dots. Dots sometimes difficult to see due to pubescent on leaves. Leaves on flowering stalk entire & persistent. Mild Turpentine smell.			Even			Spreading	Mesic to Frigid Xeric to Ustic 4500 to 8000 ft.	0.75 to 1.25 ft.	Occurs on shallow (or soils that act shallow to root growth) **Calcareous** soils. Flowers usually in groups of three or more and normally on short slender peduncles. Flower stalks arising from the outside layer of the crown.
Black Sagebrush (Green Leaf) Artemisia nova (ARNO4)	Colorless to very pale blue	Brownish-Red	Leaves 3/8 to 1/2 in. long rarely longer; having glandular dots. Leaves sticky when crushed. Leaves on flowering stalk entire & persistent. Strong Turpentine smell.			Even			Spreading	Mesic to Frigid Xeric to Ustic 4500 to 8000 ft.	0.75 to 1.75 ft.	Occurs on shallow (or soils that act shallow to root growth) **Calcareous** soils. Flowers usually in groups of three or more and normally on short slender peduncles. Flower stalks arising from the outside layer of the crown.
Low Sagebrush Artemisia arbuscula subsp. arbuscula (ARARA)	Intense blue to Creamy-blue	Creamy-blue	Leaves 1/2 to 1 in. long. Leaves on flowering stalks early-deciduous & mostly lobed. Crushed leaves have a mint-ish smell.			Uneven			Spreading	Frigid to Rarely Mesic, to Rarely Cryic Xeric to Ustic 5500 to 8200 ft.	0.75 to 1.5 ft.	Occurs on shallow (or soils that act shallow to root growth) **non-calcareous** soils. Flowers usually single (rarely 2 - 4) and are usually sessile especially at the top of the flower stocks.
Little Sagebrush Artemisia arbuscula subsp. thermopola (ARART	Intense blue to Creamy-blue	Pale Blue to Creamy-blue	Leaves 1/2 to 6/8 in. long. Ephemeral leaves persistent into late summer. Leaves on flower stocks are early-deciduous & deeply cleafed. Crushed leaves have a mint-ish smell.			Uneven to slightly Even appearing			Spreading	Friged to Cryic Ustic 7000 to 8500 ft.	0.75 to 1.5 ft.	Occurs on shallow (or soils that act shallow to root growth) **non-calcareous** igneous soils (Quartzite parent material.) This form occurs only at high elevations. Flowers usually single (rarely 2 - 4) and are usually sessile especially at the top of the flower stocks.
Early Sagebrush Alkali Sagebrush Artemisia arbuscula subsp. longiloba (ARARL)	Creamy-blue	Creamy-blue	There are two types of leaves: Type 1: Persistent leaves (0.5 to 0.7 inch) long; buck toothed. Type 2: Ephemeral leaves (0.7 to 1 inch) long and more silverish in appearance; deeply lobed.			Uneven			Spreading	Frigid to Mesic Xeric 4500 to 8000 ft.	0.75 to 2.0 ft.	Frequently layers where branches come in contact with the ground; Flowers in May and/or June whereas the other sagebrushes flower in the fall; There are two types recognized: Type 1 is a short shrub (0.6 to 1.0 ft.) Type 2 is a medium shrub (1.5 to 2 ft.) . Type 1 occurs in poorly drained or tight alkaline soils. Type 2 occurs on moderately drained alkaline soils
Mountain Silver Sagebrush Artemisia cana subsp. viscidula	Very Pale blue to Colorless	Brownish-Red	Leaves 1/4 to 1.0 inches long. Leaves deciduous. Crushed leaves smell like turpentine and sticky feeling.			Uneven			Spreading	Frigid to Mesic Xeric 6000 to 9200 ft.	0.75 to 4.0 ft.	Root sprouts; Grows in deep loam soils along mountain streams and in heavy and/or very deep snow pack areas. . Note: If Bolanderi Silver Sagebrush is ever incounterd the newer stems and the leaves will be exteramly Pubescent.

Need three or more of the characteristics to match to be sure of the species Id.

Note: material placed in Water needs to set for 3 to 4 minuets & material placed in Alcohol needs to set for 15 to 20 minutes before being analyzed under the Black Light.

Intensity of Florescent color will vary according to season of year. Ephemeral leaves will make the colors more brilliant; Times of heavy rain and/or wet snow will reduce the intensity of the colors.

Note: Material placed in water and alcohol will often fade with time (if left in solution for over 4 days) and may be misleading in some species of sagebrush. Short wave length Black lights will not work. Need a 3660 angstrom light.