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

AQUATIC RESOURCES BASELINE REPORT

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CALICO RESOURCES USA CORP.
GRASSY MOUNTAIN MINE PROJECT
AQUATIC RESOURCES BASELINE REPORT

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LIST OF ABBREVIATIONS AND ACRONYMS

BLM	Bureau of Land Management
ESA	Endangered Species Act
HDR	HDR Engineering, Inc.
OAR	Oregon Administrative Rule
ODFW	Oregon Department of Fish and Wildlife
ORS	Oregon Revised Statutes
Project	Grassy Mountain Mine Project
T&E	threatened and endangered
USFWS	United States Fish and Wildlife Service
VES	visual encounter surveys

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GRASSY MOUNTAIN MINE PROJECT
AQUATIC RESOURCES BASELINE REPORT

1 INTRODUCTION

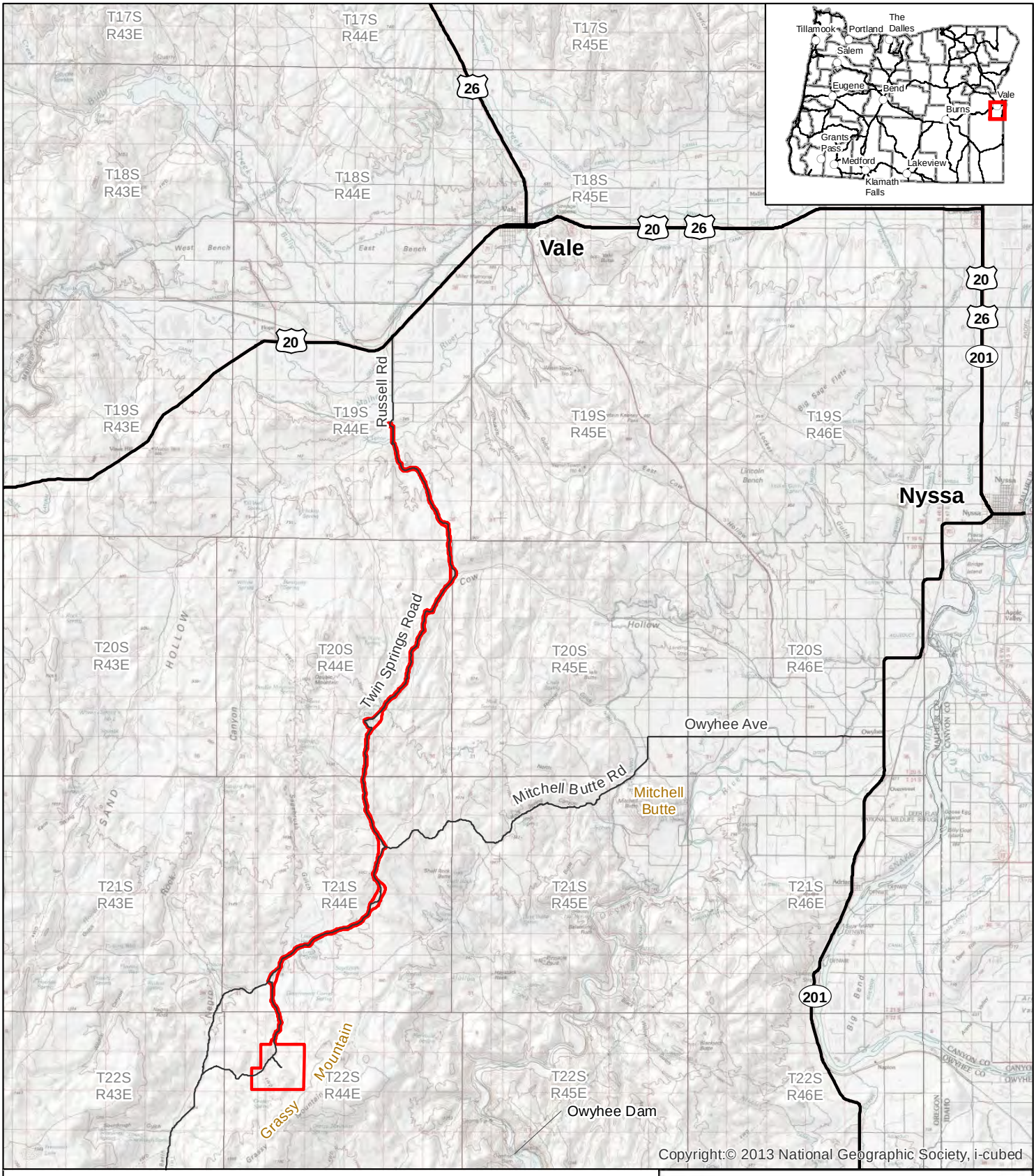
The purpose of this aquatic resources baseline report is to characterize aquatic resources in the study area prior to the start of proposed mining operations at the Grassy Mountain Mine Project (Project) in Malheur County, Oregon. Aquatic resources characterized included fish, amphibians, and aquatic macroinvertebrates. This baseline report will be used to support a National Environmental Policy Act evaluation for future mine site activities, and will be included in the Consolidated Permit Application submitted to the Oregon Department of Geology and Mineral Industries. A large portion of the text and data used in this report has been taken from the February 2015 *Aquatic Resources Baseline Study* prepared for the Project by HDR Engineering, Inc. (HDR). Additional or updated information has been added where necessary to accommodate the current permit area. No new field surveys were conducted for this report. The additional/updated information includes: 1) expansion/description of the permit area; and 2) Contacts and Preparers. The February 2015 report is included as Attachment A 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).

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 Bureau of Land Management (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.



Explanation

- Permit Area
- Existing Road

Projection: UTM Zone 11 North, NAD83, meters

0 5,000 10,000 Feet

0 1 2 Miles

N

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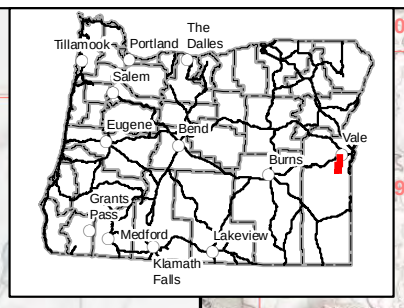
GRASSY MOUNTAIN MINE PROJECT

Location Map

Figure 1

Date:	12/19/2017	Drawn By:	JDB
Revised:		Project No.:	3672
Base Map:	USGS 100K quads: Boise, Brogan, Vale, Weiser		
File Name:	3672G_GrassyMtn_BL__Fig01_Location.mxd		

EM STRATEGIES



Russell Road

Twin Springs Road

Match Line

T19S R44E

T20S R44E

T21S R44E

T20S R45E

T22S R44E

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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.:	3672
Base Map:	USGS 7.5' quads: Double Mountain, Grassy Mountain, Kane Spring Gulch, Sourdough Spring, Vale West		
File Name:	3672G_GrassyMtn_BL__Fig02_PermitArea.mxd		

EM STRATEGIES

The Aquatic Resources Study Area (Study Area) (Figure 3) can generally be defined as follows: an eastern boundary defined by the Grassy Mountains; a southern boundary of the northern portion of Township 23 South and Range 43 East; a western boundary of the Sourdough Mountains and Hoodoo Creek; and a northern boundary defined by an east-west line, two miles north of production well PW-4.

3 REGULATORY FRAMEWORK

3.1 Federal

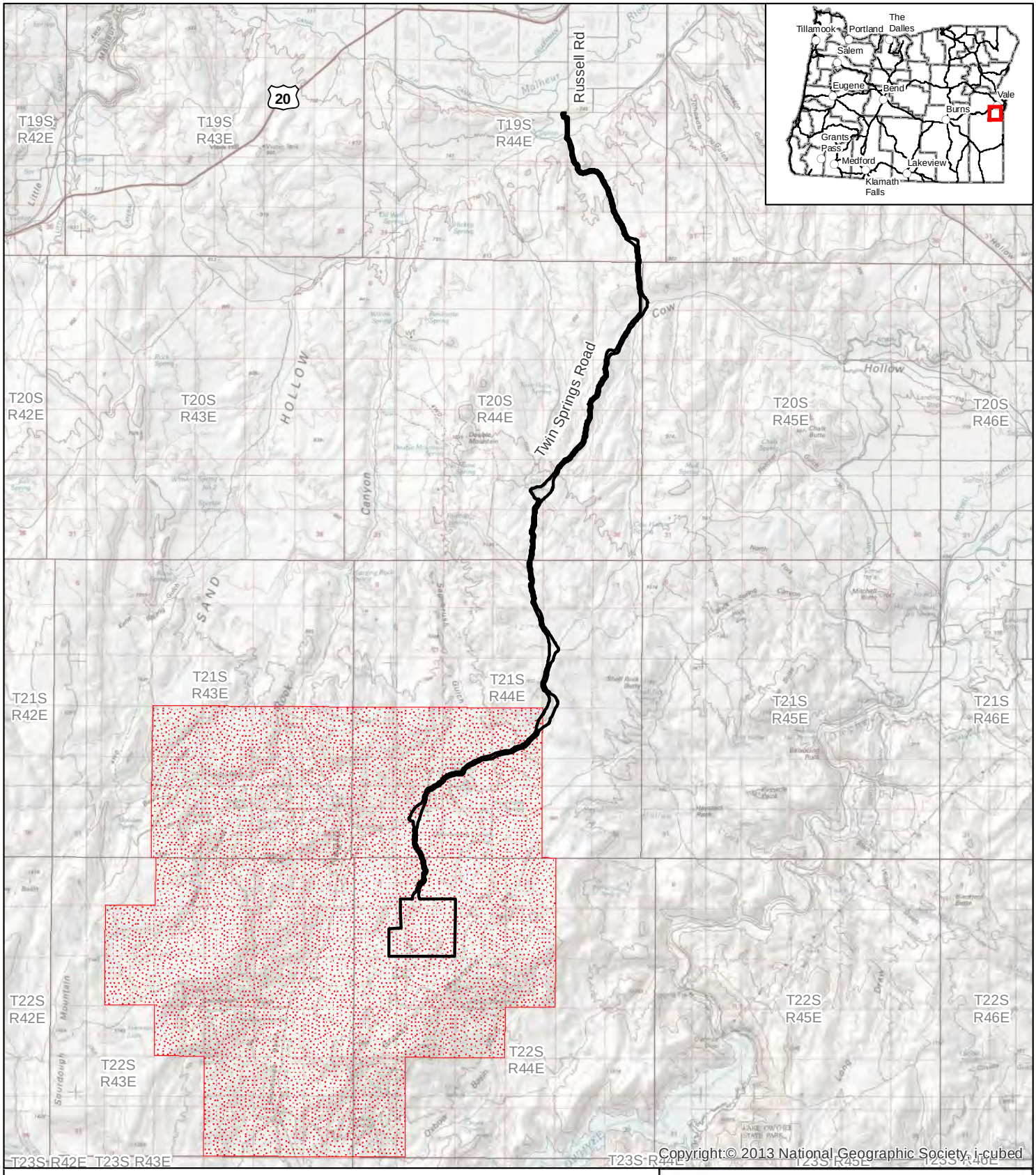
3.1.1 Federal Endangered Species Act

Section 7 of the Endangered Species Act (ESA) (19 United States Code § 1536(c)), as amended, states that any actions authorized, funded, or carried out by a federal agency does not jeopardize the continued existence of a federally-listed endangered or threatened species, or result in the destruction or adverse modification of federally-listed designated critical habitat. The action agencies are required to consult with the United States Fish and Wildlife Service (USFWS) and/or National Oceanic and Atmospheric Administration to determine whether federally-listed threatened and endangered (T&E) species or designated critical habitat are found within the vicinity of the proposed project, and to determine the proposed action's potential effects on those species or critical habitats.

3.1.2 Bureau of Land Management (Manual 6840) – Special Status Species

The BLM's policy for management of special status species is in the BLM Manual Section 6840 (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.



Explanation

- Permit Area
- Aquatic Resources Study Area

Projection: UTM Zone 11 North, NAD83, meters

0 5,000 10,000 Feet

0 1 2 Miles

N

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GRASSY MOUNTAIN MINE PROJECT

Aquatic Resources Study Area and Permit Area

Figure 3

Date:	12/19/2017	Drawn By:	JDB
Revised:		Project No.:	3672
Base Map:	USGS 100K quad: Vale		
File Name:	3672G_GrassyMtn_BL_AR_Fig03_StudyArea.mxd		

EM STRATEGIES

3.2 State

The Oregon Department of Fish and Wildlife (ODFW) manages fish and wildlife populations through objectives specified in various management plans. ODFW has direct responsibility for fish protection, and manages and protects amphibians primarily through the Oregon Conservation Strategy. In the Permit Area, the BLM manages habitat to support fish and wildlife. ODFW does not have jurisdiction over invertebrates in the Permit Area. Surveys for invertebrates will meet guidelines developed by the Oregon Department of Environmental Quality. The Oregon Department of State Lands has jurisdiction over waters of the state, including wetlands, springs, seeps, perennial streams, and intermittent streams that flow during a portion of every year and which provide spawning, rearing, or food-producing areas for food and game fish.

The State of Oregon has threatened, endangered, and sensitive species provisions that protect native vertebrates and plants on state lands (Oregon Revised Statutes [ORS] sections 496.172 to 496.192; 498.026; 564.100 to 564.135) and requires consideration of the impacts of any action on private land, in this case chemical mining, on T&E species (ORS Sections 517.956. 496.012, and 506.109).

ORS Section 517.956 establishes standards and protection measures that all chemical mining operations will follow that ensure protection measures for fish and wildlife are consistent with ODFW policies, including the following:

a) Protective measures to maintain an objective of zero wildlife mortality;
b) On-site and off-site mitigation ensuring there is no overall net loss of habitat value;
c) No loss of existing critical habitat of any state or federally-listed threatened or endangered species;
d) Fish and wildlife mortality shall be reported in accordance with a monitoring and reporting plan approved by ODFW;
e) ODFW shall establish by rule standards for review of a proposed chemical process mining operation for the purpose of developing conditions for fish and wildlife habitat protection that satisfy the terms of this section for inclusion in a consolidated permit by the Oregon Department of Geology and Mineral Industries; and
f) Surface reclamation of a chemical process mine site shall ensure environmental protection and that a self-sustaining ecosystem, comparable to undamaged ecosystems in the area, has been established in satisfaction of the operator's habitat restoration obligations.

The purpose of Oregon Administrative Rule (OAR) Chapter 635 Division 420 is to prescribe the standards for ODFW review of proposed chemical process mining operations for developing conditions for protection of wildlife and their habitat, to further the Wildlife Policy (ORS 496.012) and Food Fish Management Policy (ORS 506.109) of the State of Oregon. Baseline data collection will be consistent with what is required in developing a wildlife protection plan in accordance with OAR 635-420-0010, standards to protect wildlife in accordance with OAR 635-420-0015-0025, a habitat mitigation plan in accordance with OAR 635-420-0030 and wildlife mitigation plan in accordance with OAR 635-420-0060. Species to be addressed include all species listed under the Oregon Endangered Species Act (OAR 635-100-0100 to 0130) and Oregon Sensitive Species Rule (OAR 635-100-040).

The wildlife mitigation plan shall include the information required in OAR 635-415-0020(5). Affected wildlife habitats shall be evaluated using methodologies approved by the ODFW which are well-documented, measurable and verifiable. Examples of habitats that shall be addressed in the mitigation plan include, but are not limited to, the following:

a) Surface waterways, streams, springs, seeps, wetlands, and other aquatic habitats;
b) Riparian areas;
c) Big game habitat;
d) Bird habitat;
e) Habitat for state or federally-listed threatened or endangered species, and state sensitive species;
f) Reproduction and nursery areas;
g) Fish spawning areas;
h) Geomorphic and edaphic habitats including cliffs, caves, sand dunes, playas, and local distinctive soils that, along with their vegetation, contrast markedly with the surrounding area; and
i) Wildlife migration and movement corridors.

In addition, the ODFW manages wildlife species populations through management objectives specified in their respective management plans; the BLM manages adequate habitat to support these numbers. The BLM and ODFW work cooperatively to benefit the management of wildlife and wildlife habitat as described in a 2001 memorandum of understanding between the two agencies.

4 STUDY METHODOLOGY

4.1 Literature Review

The majority of the baseline characterization outlined in this report has been taken from the February 2015 HDR report (Attachment A). Additional or updated information has been added where necessary. References used for this report are included in Section 6, Bibliography.

4.2 Field Studies

Aquatic surveys were conducted by HDR in potentially affected waters for fish, amphibians, and aquatic macroinvertebrates. The surveys followed standard field procedures and methodologies to ensure accurate and reliable field data collection.

4.2.1 Fish

Although the ODFW's 2014 fish distribution maps indicated that fish presence was unlikely, visual assessments of streams occurred by HDR in the Study Area between May 13 and May 15, 2014, and between October 22 and October 24, 2014, to determine if water was flowing and if electrofishing surveys were feasible. Fish surveys followed backpack electrofishing protocols described by the ODFW and Oregon Department of Forestry (1995). A crew of two (one shocker and one netter) started at the downstream extent of each stream sampled and worked upstream. Potential habitat was extremely limited at the time of surveys in May; therefore, surveys extended

the entire length of available habitat. Surveys were not conducted in October as no stream habitat was available.

4.2.2 Amphibians

Following a review of documented wetlands and springs, all sites within the Study Area were visited by HDR between May 13 and May 15, 2014, and sites with potential suitable habitat on October 22 and October 24, 2014. Sites with visible water not contained within an artificial structure were surveyed for amphibians, using standard methods for visual encounter surveys (VES) described by Heyer et al. (1994) and specifically applied to Northwestern habitats and species by Olson et al. (1997). Due to the small size of each site, complete surveys were conducted rather than time-constraint surveys.

VES during both spring and fall consisted of two surveyors walking slowly and visually searching transects in a systematic way for a designated amount of time. Surveyors searched all surfaces and vegetation, turned over objects, looked in crevices of rocks and logs, and replaced all objects after examination. The duration of the survey and the length of transects were determined by the size of the wetland or spring and expanse of potential habitat adjacent to the site. Most of the potential habitat sites surveyed did not exceed ten meters in width; therefore, surveyors walked on opposite sides of the site for the entire length of the potential habitat. The surveyors noted the number and type of amphibians encountered along with the time elapsed during the survey.

4.2.3 Aquatic Macroinvertebrates

Surveys for aquatic macroinvertebrates were scheduled to coincide with amphibian surveys between October 22 and October 24, 2014, only in flowing water. No flowing water was observed; therefore, surveys were not conducted for aquatic macroinvertebrates.

5 BASELINE CHARACTERIZATION

5.1 Review of Existing Information

A review of existing information indicated that fish are unlikely to occur in the Study Area, partially due to a barrier downstream at Rye Field Reservoir (ODFW 2014). Streams in the Study Area are primarily ephemeral (HDR 2012), further reducing the likelihood of fish presence. The review yielded a list of five special status amphibian species in southeastern Oregon (Table 1). Eight invertebrate species also have special status, but none are expected to occur within the Study Area.

Table 1: Special Status Amphibian Species of Southeastern Oregon

Species	Scientific Name	Special Status
Blotched tiger salamander	*Ambystoma tigrinum melanosticum*	BLM special status (tracking)
Columbia spotted frog	*Rana luteiventris*	USFWS Species of Concern; ODFW: Sensitive-Critical
Northern leopard frog	*Rana pipiens*	BLM sensitive, ODFW (no status; it was removed when the list was updated in 2016)

Species	Scientific Name	Special Status
Western toad	*Anaxyrus boreas*	BLM special status (tracking), ODFW: Sensitive
Woodhouse toad	*Bufo woodhousii*	BLM special status (tracking)

5.2 Field Survey Results

HDR conducted field surveys between May 13 and May 15, 2014, and between October 22 and October 24, 2014. Figure 4 shows the 18 sites surveyed. Site photos, data sheets for the May 2014 surveys, and data sheets for the October 2014 surveys are included in Appendices A, B, and C of HDR's February 2015 report (Attachment A).

5.2.1 Fish

Electrofishing was feasible only in limited reaches of Negro Rock Canyon in May; HDR's aquatics survey team captured no fish. Habitat suitable for fish was limited and sites showed no connection to perennial streams. HDR observed no flowing water in October and so did not conduct fish surveys.

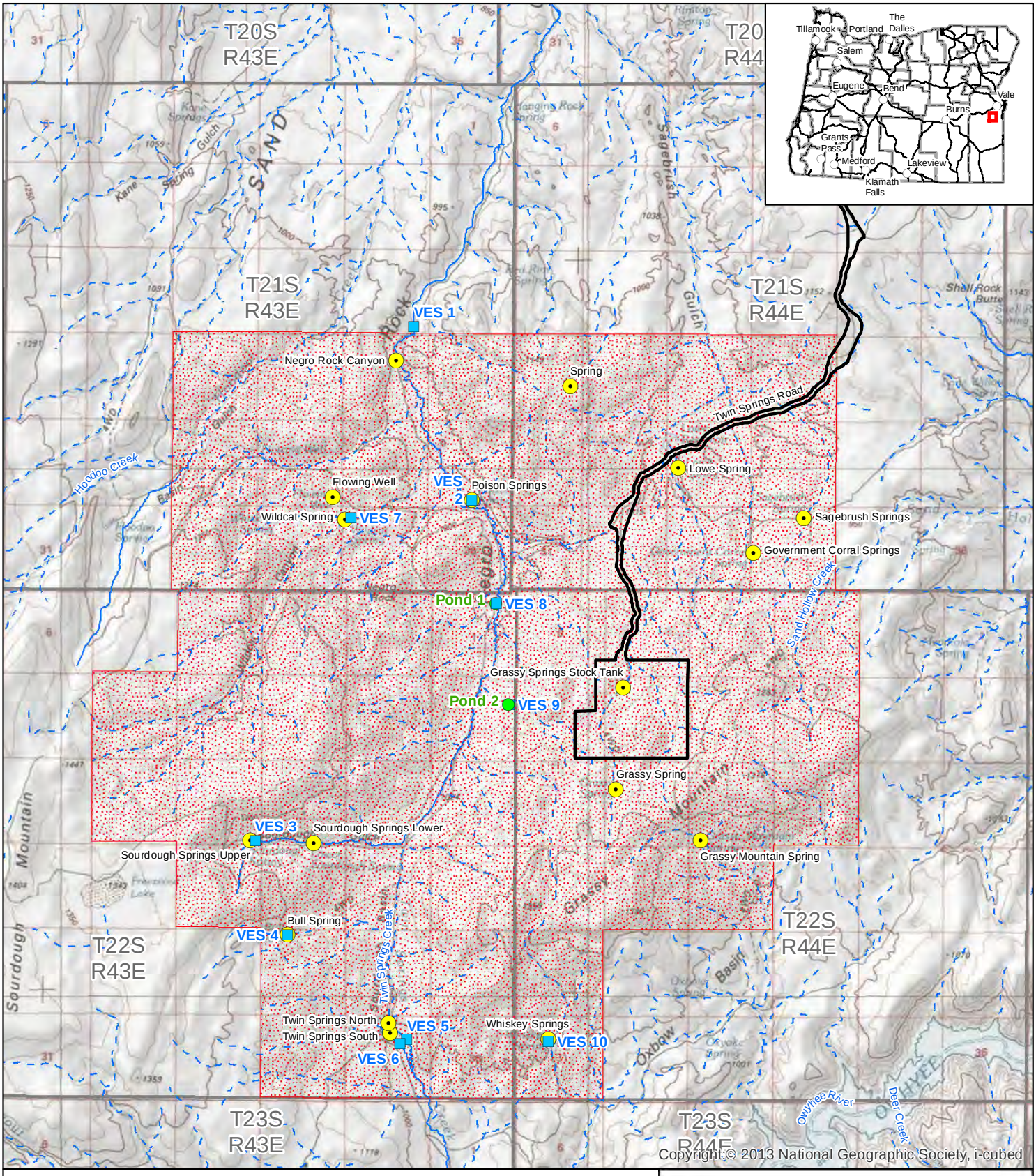
Survey results support fish distribution maps that indicate lack of fish in the Study Area (ODFW 2014). In addition to the downstream barrier at Rye Field Reservoir (ODFW 2014), fish distribution is limited by the lack of perennial and even intermittent streams with connectivity to the Study Area. Most streams are ephemeral and do not provide sufficient habitat for fish.

5.2.2 Amphibians

Of the 18 sites HDR visited, only ten included any standing or flowing water not contained by an artificial structure. Therefore, HDR surveyed only those ten sites for amphibians in May (Table 2) and October (Table 3). No special status amphibian species were observed; however, Pacific treefrog (*Pseudacris regilla*), a common species in Oregon, were observed at several sites in May (Table 2). The presence of treefrogs may be indicative of habitat suitability for other species with similar breeding requirements, which may have limited populations in the Study Area. No amphibians were observed in October (Table 3). The amount of water available differed between May and October at some sites.

Pacific treefrogs migrate to aquatic breeding sites in late winter and will remain until early summer, when they return to overwintering or aestivation sites. Therefore, this species was not anticipated in aquatic survey areas during fall, which is outside of the breeding season.

Special status amphibians likely do not occur in the Study Area because of range restrictions. Special status amphibians do occur in Malheur County, but their range does not extend as far north as the Study Area. Additionally, the Study Area does not provide suitable year-round habitat (i.e., ponds or slow-moving streams) for multi-year larval stages, such as the blotched tiger salamander (*Ambystoma tigrinum melanostictum*). Potential western toad (*Anaxyrus boreas*) habitat is present throughout the Study Area, but no adult or larval toads were observed.



Explanation

- Permit Area
- Aquatic Resources Study Area
- Perennial Stream
- Intermittent/Ephemeral Stream
- Visual Encounter Survey Area (VES)
- Pond
- Springs

Projection: UTM Zone 11 North, NAD83, meters

0 4,000 8,000 Feet

0 0.5 1 Miles

N

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GRASSY MOUNTAIN MINE PROJECT

Aquatic Resources Survey Locations

Figure 4

Date:	12/19/2017	Drawn By:	JDB
Revised:		Project No.:	3672
Base Map:	USGS 100K quad: Vale		
File Name:	3672G_GrassyMtn_BL_AR_Fig04_Points.mxd		

EM STRATEGIES

5.2.3 Aquatic Macroinvertebrates

As noted in Section 4.2.3, aquatic macroinvertebrates were not observed because no suitable habitat was observed in which to conduct surveys.

Table 2: Amphibian Survey Sites and Findings, May 2014

Site Name	Habitat Description	Visual Encounter Survey	Pacific Treefrog Present
Negro Rock Canyon	Low flow spring with areas of ponding	Yes	Yes
Poison Springs	Spring with large ponded area	Yes	Yes
Sourdough Springs (Upper and Lower)	Two springs connected by intermittent stream	Yes	Yes
Bull Spring	Piped well with trough and some overflow	Yes	No
Wildcat Spring	Seep with some flowing areas	Yes	Yes
Flowing Well	Piped well with adjacent ponding	No	--
Lowe Spring	Cattle watering trough with no water	No	--
Twin Springs North	Large seep with low flow and areas of ponding and manmade well structure at north end	Yes	Yes
Twin Springs South	Large seep with low flow and areas of ponding and manmade well structure at north point	Yes	Yes
Whiskey Springs	Spring with large tire used as trough and some flow down slope	Yes	No
Grassy Mountain Spring	Valley between hillsides with no water present	No	--
Sagebrush Springs	Piped well with trough and ponded overflow	No	--
Government Corral Springs	Piped well with trough	No	--
Spring	Valley between hillsides with no water present	No	--
Grassy Spring	Piped well with trough and ponded overflow	No	--
Grassy Springs Stock Tank	Large piped well with manmade pond	No	--
Pond 1	Large pond	Yes	No
Pond 2	Mostly dry pond with no vegetation	Yes	No

Table 3: Amphibian Survey Sites and Findings, October 2014

Site Name	Habitat Description	Visual Encounter Survey	Amphibians Present
Negro Rock Canyon	Ponded spring with minimal flow	Yes	No
Poison Springs	Spring with ponded area	Yes	No
Sourdough Springs (Upper and Lower)	Two springs connected by intermittent seep. Minimal water.	Yes	No
Bull Spring	Piped well with trough and some overflow downslope	Yes	No
Wildcat Spring	Seep with areas of low flow	Yes	No
Flowing Well	--	No	--

Site Name	Habitat Description	Visual Encounter Survey	Amphibians Present
Lowe Spring	--	No	--
Twin Springs North	Large seep with pockets of ponding and manmade well structure at north point	Yes	No
Twin Springs South	Large seep with pockets of ponding and manmade well structure at north point	Yes	No
Whiskey Springs	Spring with large tire used as trough and some flow down slope	Yes	No
Grassy Mountain Spring	--	No	--
Sagebrush Springs	--	No	--
Government Corral Springs	--	No	--
Spring	--	No	--
Grassy Spring	--	No	--
Grassy Springs Stock Tank	--	No	--
Pond 1	Large pond with some water in middle surrounded by cattails	Yes	No
Pond 2	Completely dry pond with no vegetation	Yes	No

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7 CONTACTS

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Rich DeLong – Technical Review
Ellen Farley – Editorial Review

ATTACHMENT A

Aquatic Resources Baseline Study – February 2015

Aquatic Resources Baseline Study

Grassy Mountain Exploration Project

Calico Resources USA Corporation

CALICO RESOURCES

Malheur County, Oregon

February 2015

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Appendices

Abbreviations/Acronyms

Term	Definition
BLM	Bureau of Land Management
Calico	Calico Resources USA Corporation
DOGAMI	Oregon Department of Geology and Mineral Industries
ESA	Endangered Species Act
HDR	HDR, Inc.
NOAA	National Oceanic and Atmospheric Administration
OAR	Oregon Administrative Rule
ODFW	Oregon Department of Fish and Wildlife
ORS	Oregon Revised Statutes
USFWS	U.S. Fish and Wildlife Service
VES	visual encounter survey

Chapter 1: Introduction

1.1 Purpose and Objectives

The purpose of this aquatic resources baseline report is to characterize aquatic resources in the study area prior to the start of proposed mining operations at the Grassy Mountain Project near the city of Vale in Malheur County, Oregon. Aquatic resources characterized included fish, amphibians, and aquatic macroinvertebrates.

The Oregon Department of Geology and Mineral Industries (DOGAMI), Oregon Administrative Rule (OAR) 632-037-0055, requires baseline data to be collected on state or federally-listed threatened or endangered species and habitat and state sensitive species and habitat. As outlined in OAR 635-037-0125, the baseline data collection will help determine the wildlife protection standards consistent with Oregon Department of Fish and Wildlife (ODFW) policies, including the following:

(1) Protective measures to maintain an objective of zero wildlife mortality;

(2) All chemical processing solutions and associated wastewater shall be covered or contained to preclude access by wildlife or maintained in a condition that is not harmful to wildlife;

(3) Onsite and offsite mitigation insuring there is no overall net loss of habitat value;

(4) No loss of existing critical habitat of any state or federally-listed threatened or endangered fish or wildlife species; and

(5) Any other standard adopted by rule by ODFW applicable to a chemical process mine.

1.2 Background

Calico Resources USA Corporation (Calico), a minerals exploration company and wholly-owned subsidiary of Calico Resources Corporation, engages in the acquisition, exploration, and development of mineral properties. Calico holds 100 percent interest in the Grassy Mountain Project. The project involves over 9,300 acres of unpatented mining claims administered by the U.S. Department of the Interior, Bureau of Land Management (BLM); 3 patented lode mining claims, which cover about 61 acres; 6 association placer claims; and 9 mill site claims. All proposed mining would occur on these patented claims. Calico leases an additional 1,380 acres of fee land. The proposed access road connecting the mine and mill involves about 74 acres of unpatented land. Up to 134 additional acres of fee land would accommodate the processing facilities, administration, maintenance, and the tailings storage facility. The mine and processing area are linked by a haul road on federal BLM land.

1.3 Project Area Description

The Grassy Mountain project is located in Malheur County, Oregon, about 25 miles south-southwest of the City of Vale (**Figure** 1-1**)**. 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 (**Figure 1-2)**. The project is accessed via Highway 20, west from Vale, to Russell Road. The site is approximately 25 to 30 miles up Russell Road and Twin Springs Road.

The proposed mining activities would potentially directly and indirectly affect up to 270 acres of land. This includes the proposed mine area, processing facilities and tailings disposal, and haul road

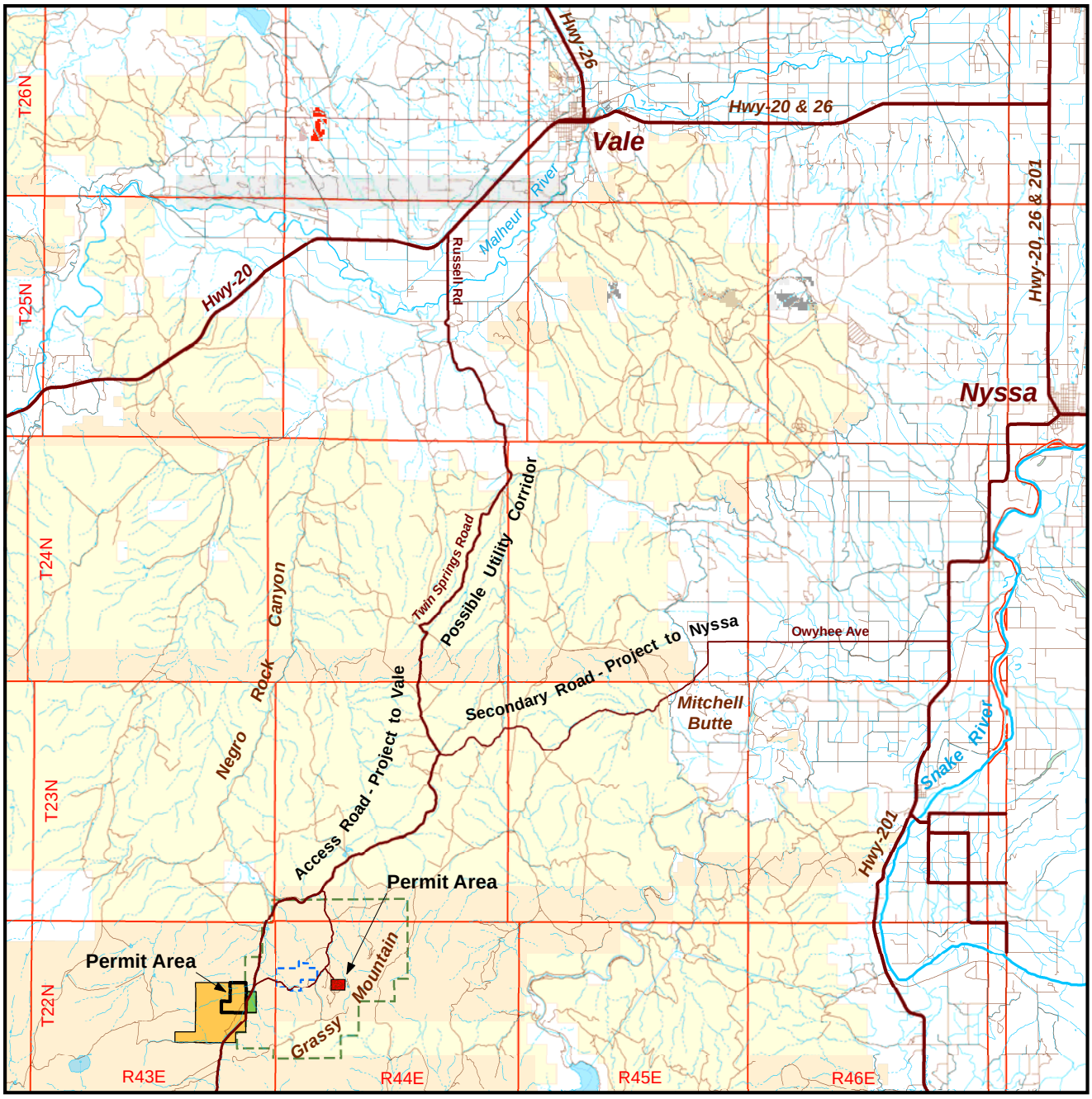
between the mine area and processing facility. More specifically, those 270± acres in the project area are defined as follows:

- Mine permit area – 62 acres
- Processing facility and tailings disposal area – 134 acres
- Access road area – 74 acres

1.4 Organization of Report

This *Aquatic Resources Baseline Study* has been organized as follows:

- Chapter 1: Introduction (purposes, background, and objectives)
- Chapter 2: Resource Study Area
- Chapter 3: Regulatory Framework
- Chapter 4: Study Methodology
- Chapter 5: Baseline Characterization
- Chapter 6: References
- Chapter 7: Contacts
- Appendices: Supporting Information



Property Explanation

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

N

0 1 2 3 4 5 km

0 1 2 3 miles

CALICO RESOURCES

Grassy Mountain Project
Malheur Co, Oregon

Location Map
March 2012

Figure 1-1.

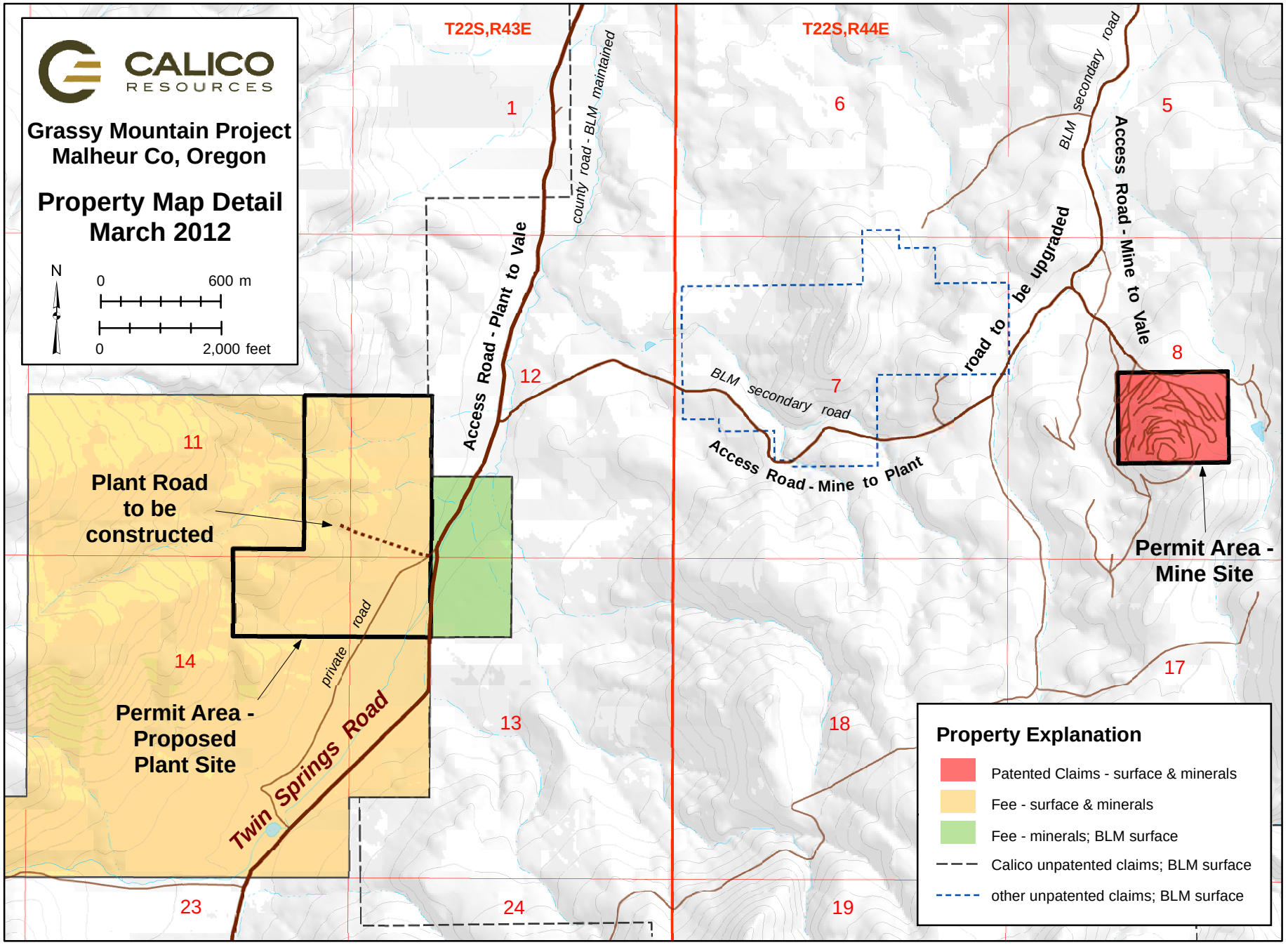

CALICO RESOURCES
Grassy Mountain Project
Malheur Co, Oregon
Property Map Detail
March 2012
N
0
600 m
0
2,000 feet
T22S,R43E
T22S,R44E
1
6
5
12
7
8
11
14
13
18
17
23
24
19
county road - BLM maintained
Access Road - Plant to Vale
BLM secondary road
Access Road - Mine to Vale
road to be upgraded
BLM secondary road
Access Road - Mine to Plant
Plant Road to be constructed
Permit Area - Proposed Plant Site
Permit Area - Mine Site
private road
Twin Springs Road
Property Explanation
Patented Claims - surface & minerals
Fee - surface & minerals
Fee - minerals; BLM surface
Calico unpatented claims; BLM surface
other unpatented claims; BLM surface

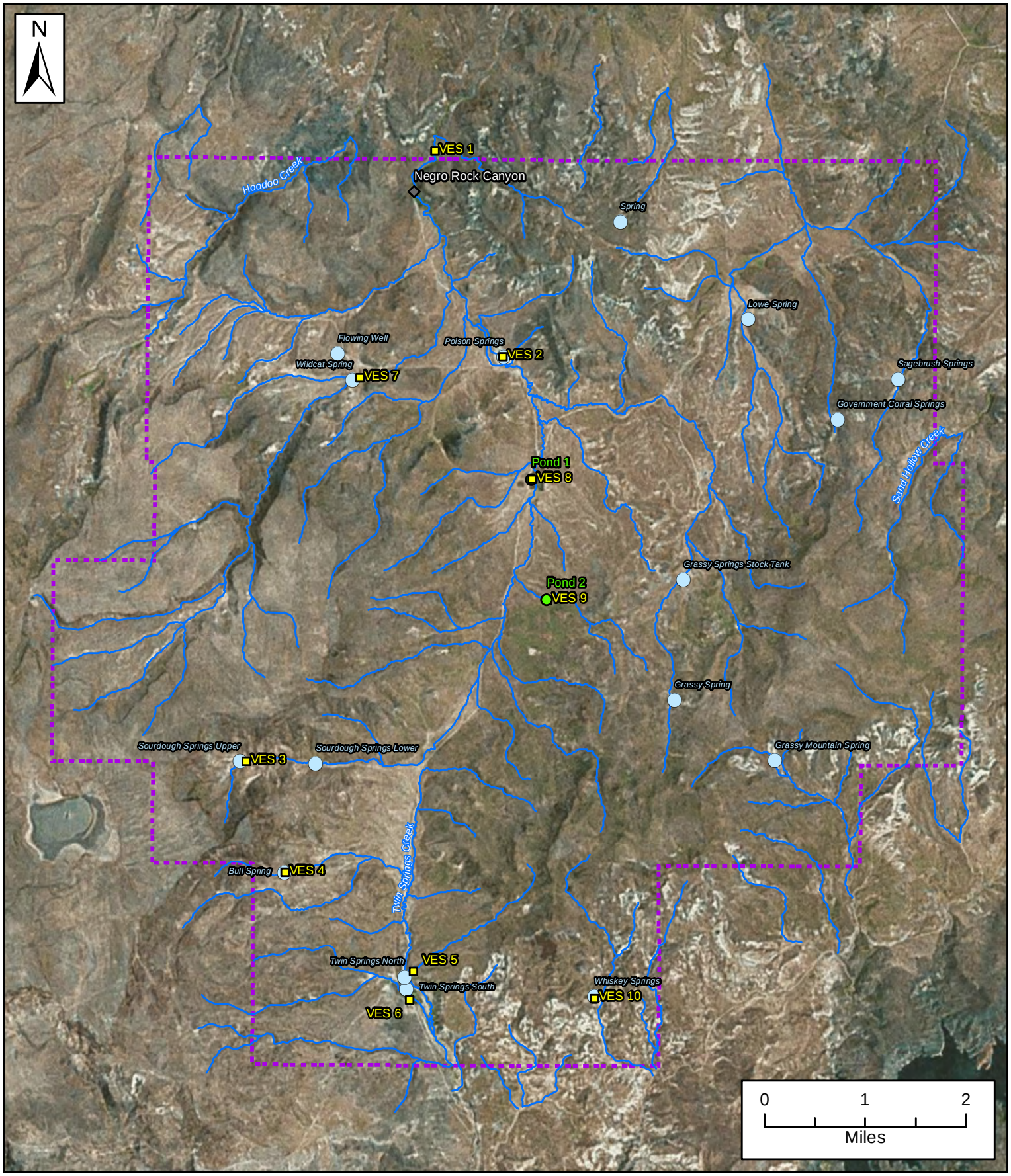
Figure 1-2.

Chapter 2: Resource Study Area

The aquatic resources study area can generally be described as having an eastern boundary defined by the Grassy Mountains; a southern boundary of the northern Township 23 South and Range 43 East; a western boundary of the Sourdough Mountains and Hoodoo Creek; and a northern boundary defined by an east-west line 2 miles north of production well 4. **Figure 2-1** shows the aquatic resources study area and the sites within the study area that HDR's aquatics survey team visited.

The study area occurs within a sagebrush/bunchgrass landscape that is characteristic of the native sagebrush community found throughout much of eastern Oregon. Much of the landscape is dominated by invasive species such as cheat grass (*Bromustectorum)* and medusahead *(Taeniatherum caputmedusae)*. Elevations within the study area range from 3,400 to 3,900 feet above mean sea level. Generally, slopes range from 2 to 8 percent. Annual precipitation is about 9.8 inches, roughly half of which falls as snow between November and March.

Surface water in the immediate study area is limited. Several drainages contain intermittent or ephemeral surface flow in the spring. Flows are erratic in response to snowmelt and/or heavy, short-term rainfall. The Owyhee River and Owyhee Lake are adjacent to the southeastern boundary of the study area.



Study Area
Spring
Streams
Visual Encounter Survey Area (VES)
Pond
Negro Rock Canyon

Figure 2-1.

Aquatic Resources Study Area

Calico Resources Grassy Mountain Project -- Malheur County, OR

Chapter 3: Regulatory Framework

3.1 State

ODFW manages fish and wildlife populations through objectives specified in various management plans. ODFW has direct responsibility for fish protection, and manages and protects amphibians primarily through the Oregon Conservation Strategy. In the study area, BLM manages habitat to support fish and wildlife. ODFW does not have jurisdiction over invertebrates in the study area. Surveys for invertebrates must meet guidelines developed by the Oregon Department of Environmental Quality. The Oregon Department of State Lands has jurisdiction over waters of the state, including wetlands, springs, seeps, perennial streams, and intermittent streams that flow during a portion of every year and which provide spawning, rearing, or food-producing areas for food and game fish.

The State of Oregon has threatened, endangered, and sensitive species provisions that protect native vertebrates and plants on state lands (Oregon Revised Statutes [ORS] sections 496.172 to 496.192; 498.026; 564.100 to 564.135) and requires consideration of the impacts of any action on private land, in this case chemical mining, on threatened and endangered species (ORS Section ORS 517.956, 496.012, and 506.109).

ORS Section 517.956 establishes standards and protection measures that all chemical mining operations must follow to ensure protection measures for fish and wildlife are consistent with ODFW policies, including the following:

(a) Protective measures to maintain an objective of zero wildlife mortality;

(b) On-site and off-site mitigation ensuring that there is no overall net loss of habitat value;

(c) No loss of existing critical habitat of any state or federally-listed threatened or endangered species;

(d) Fish and wildlife mortality shall be reported in accordance with a monitoring and reporting plan approved by ODFW;

(e) ODFW shall establish by rule standards for review of a proposed chemical process mining operation for the purpose of developing conditions for fish and wildlife habitat protection that satisfy the terms of this section for inclusion in a consolidated permit by DOGAMI; and

(f) Surface reclamation of a chemical process mine site shall ensure environmental protection and that a self-sustaining ecosystem, comparable to undamaged ecosystems in the area, has been established in satisfaction of the operator's habitat restoration obligations.

The purpose of OAR Chapter 635 Division 420 is to prescribe the standards for ODFW 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 496.012), and Food Fish Management Policy (ORS 506.109) of the State of Oregon. Baseline data collection must be consistent with what is required in developing a wildlife protection plan in accordance with OAR 635-420-0010, standards to protect wildlife in accordance with OAR 635-420-0015-0025, a habitat mitigation plan in accordance with OAR 635-420-0030, and wildlife mitigation plan in accordance with OAR 635-420-0060. Species to be addressed include all species listed under the Oregon Endangered Species Act (OAR 635-100-0100 to 0130) and Oregon Sensitive Species Rule (OAR 635-100-040).

3.2 Federal

Potential federal requirements include those that may be National Environmental Policy Act-related, Endangered Species Act (ESA) consultations, and critical habitat procedural requirements. Agencies involved may be the U.S. Fish and Wildlife Service (USFWS), the National Oceanic and Atmospheric Administration (NOAA), or the BLM.

Section 7 of the ESA (19 United States Code [USC] § 1536(c)), as amended, states that any action authorized, funded, or carried out by a federal agency does not jeopardize the continued existence of a federally-listed endangered or threatened species, or result in the destruction or adverse modification of federally-listed designated critical habitat. The action agencies are required to consult with USFWS or NOAA to determine whether federally-listed endangered or threatened species or designated critical habitat are found within the vicinity of the proposed project, and to determine the proposed action's potential effects on those species or critical habitats.

The BLM defines sensitive species as *"... those 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.*"

Chapter 4: Study Methodology

4.1 Literature Review

Prior to beginning field work, HDR's aquatics survey team reviewed available reports, maps, and data addressing aquatic resources. These materials include the following:

- Fish distribution maps to determine the likelihood of fish presence in the study area.
    - ODFW. 2014. *Natural Resources Information Management Program*. https://nrimp.dfw.state.or.us/nrimp/default.aspx?p=259.
- Lists of special status animal species in southeastern Oregon to ensure that surveys were conducted with these species in mind.
    - BLM. Vale District. 2001. *Proposed Southeastern Oregon Resource Management Plan and Final Environmental Impact Statement*. http://www.blm.gov/or/districts/vale/plans/files/seormp/SEORMP-FEIS-Vol1Txt.pdf
    - ODFW. 2008. *Oregon Department of Fish and Wildlife Sensitive species: frequently asked questions and sensitive species list, organized by category*. http://www.dfw.state.or.us/wildlife/diversity/species/docs/SSL_by_category.pdf
- ODFW. 2006. *The Oregon Conservation Strategy, Northern Basin and Range Ecoregion*. http://www.dfw.state.or.us/conservationstrategy/docs/document_pdf/b-eco_nb.pdf
- HDR's recent wetland delineation report because it describes many streams in the study area.
    - HDR. 2012. *Draft Wetland Delineation Report*, Calico Resources Grassy Mountain Project.
- Other reports provided relevant background information.
    - ABC (Adrian Brown Consultants, Inc.). 1992. Physical Resources Technical Memorandum for Atlas Precious Metals Inc. Grassy Mountain Project. Environmental Impact Statement.
    - ABC. 1992. Water Resources Technical Memorandum for Atlas Precious Metals Inc. Grassy Mountain Project. Environmental Impact Statement, Vol II & Vol III. **Error! Reference source not found.**

4.2 Field Studies

HDR's aquatics survey team (Error! Reference source not found.) conducted surveys in potentially affected waters for fish, amphibians, and aquatic macroinvertebrates. They followed standard field procedures and methodologies to ensure accurate and reliable field data collection.

Table 4-1. HDR's Aquatic Survey Team

Surveyor	Survey		Title	Education	Years of Experience
	Spring	Fall			
Sara Twitchell	X	X	Environmental Scientist	MS – Environmental Science	11
Matt Hutchinson	X		Environmental Scientist	BS – Wildlife Biology	11
Gabe McGuire		X	Aquatic Scientist	BS - Environmental Science	9

4.2.1 Fish

Although ODFW's 2014 fish distribution maps indicated that fish presence was unlikely, HDR's aquatics survey team visually assessed streams in the study area between May 13 and May 15, 2014, and between October 22 and October 24, 2014, to determine if water was flowing and if electrofishing surveys were feasible. Fish surveys followed backpack electrofishing protocols described by ODFW and the Oregon Department of Forestry (1995). A crew of two (one shocker and one netter) started at the downstream extent of each stream sampled and worked upstream. Because potential habitat was extremely limited at the time of surveys in May, surveys extended the entire length of available habitat. No stream habitat was available in October; therefore, HDR did not conduct surveys.

4.2.2 Amphibians

Following a review of documented wetlands and springs, HDR's aquatics survey team visited all sites within the study area between May 13 and May 15, 2014, and sites with potential suitable habitat on October 22 and October 24, 2014. Sites with visible water not contained within an artificial structure were surveyed for amphibians, using standard methods for visual encounter surveys (VES) described by Heyer et al. (1994) and specifically applied to Northwestern habitats and species by Olson et al. (1997). Although HDR's aquatics survey team visited sites with suitable habitat in both spring and fall, as specified in the approved work plan for time-constraint surveys, the small size of each site allowed for complete surveys rather than time-constraint surveys.

VES during both spring and fall consisted of two surveyors walking slowly and visually searching transects in a systematic way for a designated amount of time. Surveyors searched all surfaces and vegetation, turned over objects, looked in crevices of rocks and logs, and replaced all objects after examination. The duration of the survey and the length of transects were determined by the size of the wetland or spring and expanse of potential habitat adjacent to the site. Because most of the potential habitat sites surveyed did not exceed 10 meters in width, surveyors walked on opposite sides of the site for the entire length of the potential habitat. The surveyors noted the number and type of amphibians encountered along with the time elapsed during the survey.

4.2.3 Aquatic Macroinvertebrates

Surveys for aquatic macroinvertebrates were scheduled to coincide with amphibian surveys between October 22 and October 24, 2014. Surveys were to be conducted only in flowing water. No flowing water was observed; therefore, HDR did not conduct surveys for aquatic macroinvertebrates.

Chapter 5: Baseline Characterization

5.1 Review of Existing Information

HDR's review of existing information indicated that fish are unlikely to occur in the study area, partially because of a barrier downstream at Rye Field Reservoir (ODFW 2014). Streams in the study area are primarily ephemeral (HDR 2012), further reducing the likelihood of fish presence. The review yielded a list of five special status amphibian species in southeastern Oregon (**Table 5-1**). Eight invertebrate species also have special status, but none are expected to occur within the study area.

Table 5-1. Special Status Amphibian Species of Southeastern Oregon

Species	Scientific Name	Special Status
Blotched Tiger Salamander	*Ambystoma tigrinum melanostictum*	BLM special status (tracking)
Columbia Spotted Frog	*Rana luteiventris*	USFWS candidate species
Northern Leopard Frog	*Rana pipiens*	BLM sensitive, ODFW sensitive (critical)
Western Toad	*Anaxyrus boreas*	BLM special status (tracking), ODFW sensitive (vulnerable)
Woodhouse Toad	*Bufo woodhousii*	BLM special status (tracking)

BLM=Bureau of Land Management; USFWS=U.S. Fish and Wildlife Service; ODFW=Oregon Department of Fish and Wildlife

5.2 Field Survey Results

HDR conducted field surveys between May 13 and May 15, 2014 and between October 22 and October 24, 2014. **Figure 2-1** shows the 18 sites surveyed. Appendix A contains photos of each site. Appendix B contains data sheets completed for the May surveys. Appendix C contains data sheets completed for the October surveys.

5.2.1 Fish

Electrofishing was feasible only in limited reaches of Negro Rock Canyon in May; HDR's aquatics survey team captured no fish. Habitat suitable for fish was limited and sites showed no connection to perennial streams. HDR observed no flowing water in October and so did not conduct fish surveys.

Survey results support fish distribution maps that indicate lack of fish in the study area (ODFW 2014). In addition to the downstream barrier at Rye Field Reservoir (ODFW 2014), fish distribution is limited by the lack of perennial and even intermittent streams with connectivity to the study area. Most streams are ephemeral and do not provide sufficient habitat for fish.

5.2.2 Amphibians

Of the 18 sites HDR visited, only 10 included any standing or flowing water not contained by an artificial structure. Therefore, HDR surveyed only those 10 sites for amphibians in May (**Table 5-2**) and October (**Table 5-3**). No special status amphibian species were observed; however, Pacific treefrog (*Pseudacris regilla*), a common species in Oregon, were observed at several sites in May (**Table 5-2**). The presence of treefrogs may be indicative of habitat suitability for other species with similar breeding requirements, which may have limited populations in the study area. No amphibians

were observed in October (**Table 5-3**). The amount of water available differed between May and October at some sites.

Pacific treefrogs migrate to aquatic breeding sites in late winter and will remain until early summer, when they return to overwintering or aestivation sites. Therefore, this species was not anticipated in aquatic survey areas during fall, which is outside of the breeding season.

Special status amphibians likely do not occur in the study area because of range restrictions. Special status amphibians do occur in Malheur County, but their range does not extend as far north as the study area. Additionally, the study area does not provide suitable year-round habitat (i.e., ponds or slow moving streams) for multi-year larval stages, such as the blotched tiger salamander (*Ambystoma tigrinum melanostictum*). Potential western toad (*Anaxyrus boreas*) habitat is present throughout the study area, but no adult or larval toads were observed.

Table 5-2. Amphibian Survey Sites and Findings, May 2014

Site Name	Habitat Description	Visual Encounter Survey	Pacific Treefrog Present
Negro Rock Canyon	Low flow spring with areas of ponding	Yes	Yes
Poison Springs	Spring with large ponded area	Yes	Yes
Sourdough Springs (Upper and Lower)	Two springs (upper and lower) connected by intermittent stream	Yes	Yes
Bull Spring	Piped well with trough and some overflow	Yes	No
Wildcat Spring	Seep with some flowing areas	Yes	Yes
Flowing Well	Piped well with adjacent ponding	No	--
Lowe Spring	Cattle watering trough with no water	No	--
Twin Springs North	Large seep with low flow and areas of ponding and manmade well structure at north end	Yes	Yes
Twin Springs South	Large seep with low flow and areas of ponding and manmade well structure at north point	Yes	Yes
Whiskey Springs	Spring with large tire used as trough and some flow down slope	Yes	No
Grassy Mountain Spring	Valley between hillsides with no water present	No	--
Sagebrush Springs	Piped well with trough and ponded overflow	No	--
Government Corral Springs	Piped well with trough	No	--
Spring	Valley between hillsides with no water present	No	--
Grassy Spring	Piped well with trough and ponded overflow	No	--
Grassy Springs Stock Tank	Large piped well with manmade pond	No	--
Pond 1	Large pond	Yes	No
Pond 2	Mostly dry pond with no vegetation	Yes	No

Table 5-3. Amphibian Survey Sites and Findings, October 2014

Site Name	Habitat Description	Visual Encounter Survey	Amphibians Present
Negro Rock Canyon	Ponded spring with minimal flow	Yes	No
Poison Springs	Spring with ponded area	Yes	No
Sourdough Springs (Upper and Lower)	Two springs (upper and lower) connected by intermittent seep. Minimal water.	Yes	No
Bull Spring	Piped well with trough and some overflow downslope	Yes	No
Wildcat Spring	Seep with some areas of low flow	Yes	No
Flowing Well	--	No	--
Lowe Spring	--	No	--
Twin Springs North	Large seep with pockets of ponding and manmade well structure at north point	Yes	No
Twin Springs South	Large seep with pockets of ponding and manmade well structure at north point	Yes	No
Whiskey Springs	Spring with large tire used as trough and some flow down slope	Yes	No
Grassy Mountain Spring	--	No	--
Sagebrush Springs	--	No	--
Government Corral Springs	--	No	--
Spring	--	No	--
Grassy Spring	--	No	--
Grassy Springs Stock Tank	--	No	--
Pond 1	Large pond with some water in middle surrounded by cattails	Yes	No
Pond 2	Completely dry pond with no vegetation	Yes	No

5.2.3 Aquatic Macroinvertebrates

As noted in **Section 4.2.3**, aquatic macroinvertebrates were not observed because no suitable habitat was observed in which to conduct surveys.

5.3 Summary

In the study area, HDR's aquatics survey team did not capture any fish, and observed that most streams are ephemeral and do not provide sufficient habitat for fish. The survey team did not observe any special status amphibian species. Although some special status amphibians do occur in Malheur County, their range does not extend as far north as the study area, and the study area does not provide suitable year-round habitat for multi-year larval stages. However, the presence of the common Pacific treefrog at several sites during the May surveys could indicate habitat suitability for other species with similar breeding requirements, which may have limited populations in the study area. Finally, the survey team did not observe any suitable habitat for aquatic macroinvertebrates in the study area; therefore, they did not observe any aquatic macroinvertebrates.

Chapter 6: References

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ODFW (Oregon Department of Fish & Wildlife). 2008. Oregon Department of Fish and Wildlife Sensitive species: frequently asked questions and sensitive species list, organized by category. http://www.dfw.state.or.us/wildlife/diversity/species/docs/SSL_by_category.pdf

ODFW (Oregon Department of Fish & Wildlife). 2014. Natural Resources Information Management Program. https://nrimp.dfw.state.or.us/nrimp/default.aspx?p=259.

ODFW (Oregon Department of Fish & Wildlife) and the Oregon Department of Forestry (1995). *Surveying Forest Streams for Fish Use*.

Olson, D. H., W. P. Leonard, and R. B. Bury, editors. 1997. *Sampling amphibians in lentic habitats*. Society for Northwestern Vertebrate Biology, Northwest Fauna 4, Olympia, Washington, USA.

Chapter 7: Contacts

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A

Appendix A: Site Photos

Photo A-1. Negro Rock Canyon

Photo A-4. Between Upper and Lower Sourdough Springs

Photo A-2. Poison Springs

Photo A-5. Bull Spring

Photo A-3. Sourdough Springs - tank

Photo A-6. Wildcat Spring

Photo A-7. Flowing Well

Photo A-10. Twin Springs South

Photo A-8. Lowe Spring

Photo A-11. Whiskey Springs - trough

Photo A-9. Twin Springs North

Photo A-12. Whiskey Springs – down slope

Photo A-13. Grassy Mountain Spring

Photo A-16. Spring

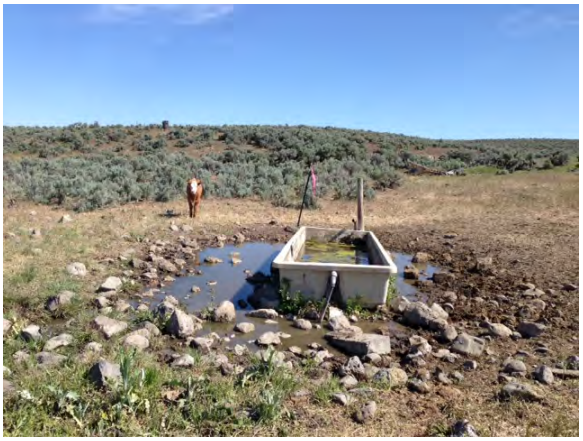

Photo A-14. Sagebrush Spring

Photo A-17. Grassy Spring

Photo A-15. Government Corral Springs

Photo A-18. Grassy Springs Stock Tank

Photo A-19. Pond 1

Photo A-20. Pond 2

B

Appendix B: Data Forms – May 2014

Amphibian Species Surveys

Site ID: VES 1

Date: 5/13/14

Team Members: ST MH

Geographic coordinates

Location: Negro Rock Canyon Reach 1

County: Malheur Elevation: 3000 ft.

Start survey. East UTM: 43.738246 5608 North UTM: -117.41464932

End survey. East UTM: 43.7382345 7653 North UTM: -117.41825919

Estimated search area. Length (m): 850 m Width (m): 45 m

Survey duration

Survey start time: 10:45 End time: 11:50 Total duration: 65 min

Weather

Weather: (Clear) Overcast Rain Wind: (Calm) Light Strong

Temperature (air) Begin: 17°C End: 19°C

Precipitation-- Current: None Last 48 hrs: None Last 10 days:

Habitat

Slope % and aspect: 0

COVER EXAMINED

Rocks %: Talus Rock pile Outcrop

Logs %:

Other % (specify):

Overall extent of moss cover %:

Moisture under cover: Dry Moist (Free water present)

VEGETATION

Upland habitat type: Mixed hardwood conifer Chaparral Ponderosa pine Riparian deciduous Sage-Steppe

Tree species and abundance (A=abundant, C =common, F=few):

None

Shrub species and abundance (A,C,F):

Sage C

Other plant species and abundance (A,C,F):

Reeds, grasses, tulle

POTENTIAL HABITAT

Extent of potential habitat at site (area, UTM boundaries):

~~Quality of potential habitat~~ for LS: ~~Excellent~~ ~~Good~~ ~~Fair~~ Poor

Photographs

Number	Description	UTM E	UTM N
106	North - START of VES		
107	South - Start of VES		
108-109	PSRE tadpoles		
110	North - End of ponded section		
111	South - End of pond		
112-113	Matt fishing at stream section		
114	9 N at end of VES stream		
115	10 S at end of VES stream		
116	11 Marshy end of VES area		

Amphibian/reptile species observed

Species	Life stage	SVL (mm)	Microhabitat (type and position on slope)	Comments	Survey method
PSRE	L	Various	Ponded seep in grassy canyon	tree frog larvae seem abundant	VES
PSRE	A	35-45 mm	at least 10 present throughout survey	- ponded tulle	

Species codes: Blotched tiger salamander (AMTI), Columbia spotted frog (RALU), Northern leopard frog (RAPI), Western toad (ANBO), Woodhouse toad (BUWO), rough-skinned newt (TAGR), Pacific tree frog (PSRE), and Great Basin spadefoot toad (SCIN).
Microhabitat examples: rock on rock, rock on soil, log on soil, crevice of outcrop

Impacts to amphibian habitat

Current land use: Rangeland

Current surface water elevation: _____

Description of adjacent lands: _____

Distance between suitable limestone salamander habitat and current maximum water surface elevation (m) : _____

Possible Project nexus: _____

Amphibian Species Surveys

Site ID: VES 2

Date: 5/13/14

Team Members: ST MH

Geographic coordinates

Location: Poison Spring

County: Malheur Elevation: 3200 Ft

Start survey. East UTM: 43.7098227634 North UTM: -117.40148054

End survey. East UTM: 43.7086388059 North UTM: -117.40041531

Estimated search area. Length (m): 250 Width (m): 95

Survey duration

Survey start time: 12:15 End time: 12:40 Total duration: 20 min

Weather

Weather: (Clear) Overcast Rain Wind: (Calm) Light Strong

Temperature (air) Begin: 20°C End: 22°C

Precipitation-- Current: N Last 48 hrs: N Last 10 days: N

Habitat

Slope % and aspect: > 5%

COVER EXAMINED

Rocks %: _____ Talus Rock pile Outcrop

Logs %: _____

Other % (specify): _____

Overall extent of moss cover %: _____

Moisture under cover: Dry Moist Free water present

VEGETATION

Upland habitat type: Mixed hardwood conifer Chaparral Ponderosa pine Riparian deciduous Shrub-steppe

Tree species and abundance (A=abundant, C =common, F=few):

None

Shrub species and abundance (A,C,F):

Sage, Rabbit bush

Other plant species and abundance (A,C,F):

grass tulle

POTENTIAL HABITAT

Extent of potential habitat at site (area, UTM boundaries): 2 acres

Quality of potential habitat for ~~RS~~ BH: Excellent (Good) Fair Poor

Photographs

Number	Description	UTM E	UTM N
12 (117)	VA Northern part poison spring		
V129	Poison Spring		
128-129	well (?) at poison spring		

Amphibian/reptile species observed

Species	Life stage	SVL (mm)	Microhabitat (type and position on slope)	Comments	Survey method
PSRE	A	35-45 MM	in water / grass	4x adults of varying size	VES
			Other species: Red wing bb, ducks (mallards)		

Species codes: Blotched tiger salamander (AMTI), Columbia spotted frog (RALU), Northern leopard frog (RAPI), Western toad (ANBO), Woodhouse toad (BUWO), rough-skinned newt (TAGR), Pacific tree frog (PSRE), and Great Basin spadefoot toad (SCIN).
Microhabitat examples: rock on rock, rock on soil, log on soil, crevice of outcrop

Impacts to amphibian habitat

Current land use: Rangeland

Current surface water elevation: _____

Description of adjacent lands: _____

Distance between suitable limestone salamander habitat and current maximum water surface elevation (m): _____

Possible Project nexus: _____

Amphibian Species Surveys

Site ID: Sourdough Gulch VES 3

Date: 5/13/14

Team Members: ST MH

Geographic coordinates

Location: Sourdough Gulch

County: Malheur Elevation: 3700 ft

Start survey. East UTM: 43.650203 6983 North UTM: -117.45093999

End survey. East UTM: 43.649839 5833 North UTM: -117.436 234207

Estimated search area. Length (m): 1,200 Width (m): 6

Survey duration

Survey start time: 2:20 End time: 3:00 Total duration: 40 min

Weather

Weather: (Clear) Overcast Rain Wind: (Calm) Light Strong

Temperature (air) Begin: 22°C End: 24°C

Precipitation-- Current: N Last 48 hrs: N Last 10 days: N

Habitat

Slope % and aspect: >50%

COVER EXAMINED

Rocks %: _____ Talus Rock pile Outcrop

Logs %: _____

Other % (specify): _____

Overall extent of moss cover %: _____

Moisture under cover: Dry Moist Free water present

VEGETATION

Upland habitat type: Mixed hardwood conifer Chaparral Ponderosa pine Riparian deciduous

Tree species and abundance (A=abundant, C =common, F=few):

None

Shrub species and abundance (A,C,F):

Sage

Other plant species and abundance (A,C,F):

Reeds, grasses, Sedges

POTENTIAL HABITAT

Extent of potential habitat at site (area, UTM boundaries): _____

Quality of potential habitat for LS: Excellent (Good) Fair Poor

Photographs

Number	Description	UTM E	UTM N
130 ~~132~~	trail to gulch (start at lower SD gulch)		
131	well at Lower SD spring		
132	Lower SD Spring looking E		
→ 134	same		
135	Example of ponded seep		
136	pretty flowers		
137	End of survey upper SD spring		

Amphibian/reptile species observed

Species	Life stage	SVL (mm)	Microhabitat (type and position on slope)	Comments	Survey method
PSRE	A	45-55mm	in small pockets of ponds ~5 adults		
PSRE	L	>5mm	in cow watering Reservoir/well		

Species codes: Blotched tiger salamander (AMTI), Columbia spotted frog (RALU), Northern leopard frog (RAPI), Western toad (ANBO), Woodhouse toad (BUWO), rough-skinned newt (TAGR), Pacific tree frog (PSRE), and Great Basin spadefoot toad (SCIN).
Microhabitat examples: rock on rock, rock on soil, log on soil, crevice of outcrop

Impacts to amphibian habitat

Current land use: Rangeland

Current surface water elevation: _____

Description of adjacent lands: _____

Distance between suitable limestone salamander habitat and current maximum water surface elevation (m) : _____

Possible Project nexus: _____

Amphibian Species Surveys

Site ID: VES 4

Date: 5/13/14

Team Members: ST & MH

Geographic coordinates

Location: Bull Spring

County: Malheur Elevation: 3720 ft

Start survey. East UTM: 43.634178196 8 North UTM: -117.44313941

End survey. East UTM: 43.634293454 5 North UTM: -117.44267781 4

Estimated search area. Length (m): 40 m Width (m): 6 m

Survey duration

Survey start time: 3:30 End time: 3:40 Total duration: 10 min

Weather

Weather: (Clear) Overcast Rain Wind: (Calm) Light Strong

Temperature (air) Begin: 24°C End: 24°C

Precipitation-- Current: N Last 48 hrs: N Last 10 days: N

Habitat

Slope % and aspect:

COVER EXAMINED

Rocks %: Talus Rock pile Outcrop

Logs %:

Other % (specify):

Overall extent of moss cover %:

Moisture under cover: Dry Moist Free water present

VEGETATION

Upland habitat type: ~~Mixed hardwood-conifer Chaparral Ponderosa pine Riparian deciduous~~ Scrub-shrub

Tree species and abundance (A=abundant, C =common, F=few):

None

Shrub species and abundance (A,C,F):

Sage

Other plant species and abundance (A,C,F):

grasses, reeds, Rushes

POTENTIAL HABITAT

Extent of potential habitat at site (area, UTM boundaries): Survey area

Quality of potential habitat for LS: Excellent Good Fair (Poor)

Photographs

Number	Description	UTM E	UTM N
138	wet		
139	pooled water		

Amphibian/reptile species observed

Species	Life stage	SVL (mm)	Microhabitat (type and position on slope)	Comments	Survey method
			None found		

Species codes: Blotched tiger salamander (AMTI), Columbia spotted frog (RALU), Northern leopard frog (RAPI), Western toad (ANBO), Woodhouse toad (BUWO), rough-skinned newt (TAGR), Pacific tree frog (PSRE), and Great Basin spadefoot toad (SCIN).
Microhabitat examples: rock on rock, rock on soil, log on soil, crevice of outcrop

Impacts to amphibian habitat

Current land use: Rangeland

Current surface water elevation: Rangeland / BPA corridor

Description of adjacent lands: _____

Distance between suitable limestone salamander habitat and current maximum water surface elevation (m) : _____

Possible Project nexus: _____

Amphibian Species Surveys

Site ID: VES 5

Date: 5/14/14

Team Members: ST & MH

Geographic coordinates

Location: Twin Spring North

County: Malheur Elevation: 3200 ft

Start survey. East UTM: 43.61089 North UTM: -117.4136

End survey. East UTM: 43.616313 North UTM: -117.4149 37602

Estimated search area. Length (m): 725 Width (m): 10

Survey duration

Survey start time: 10:45 End time: 11:20 Total duration: 35 min

Weather

Weather: (Clear) Overcast Rain 18°C Wind: (Calm) Light Strong

Temperature (air) Begin: ~~20~~ End: ~~22~~ 20°C

Precipitation-- Current: None Last 48 hrs: None Last 10 days: N/A

Habitat

Slope % and aspect:

COVER EXAMINED

Rocks %: Talus Rock pile Outcrop

Logs %:

Other % (specify):

Overall extent of moss cover %:

Moisture under cover: Dry Moist Free water present

VEGETATION

Upland habitat type: Mixed hardwood conifer Chaparral Ponderosa pine Riparian deciduous

Tree species and abundance (A=abundant, C =common, F=few):

Acacia

Shrub species and abundance (A,C,F):

Sage, shrub-steeppe - C

Other plant species and abundance (A,C,F):

Rushes, grasses - C, tules

POTENTIAL HABITAT

Extent of potential habitat at site (area, UTM boundaries): As surveyed - extends South of project area

Quality of potential habitat for LS: Excellent Good (Fair) Poor

Photographs

Number	Description	UTM E	UTM N
163	overview		
164	Showing water facing N		
165	Ponded area w/ tules		
166	tree frogs		
167	ponded area in dry reeds		
168	End of VES		
169-170	End of VES		
171-173	watering trough associated w/ twin springs upper		

Amphibian/reptile species observed

Species	Life stage	SVL (mm)	Microhabitat (type and position on slope)	Comments	Survey method
PSRE	A	35-45mm	in water or reeds near water	1/6 adults seen	VES
PSRE	L	10-25mm	in ponded areas of water near veg	one group of larvae were in a small puddle and were ~5mm larger than Avg.	VES

Species codes: Blotched tiger salamander (AMTI), Columbia spotted frog (RALU), Northern leopard frog (RAPI), Western toad (ANBO), Woodhouse toad (BUWO), rough-skinned newt (TAGR), Pacific tree frog (PSRE), and Great Basin spadefoot toad (SCIN).
Microhabitat examples: rock on rock, rock on soil, log on soil, crevice of outcrop

Impacts to amphibian habitat

Current land use: Agriculture / Range land

Current surface water elevation: _____

Description of adjacent lands: open range

Distance between suitable limestone salamander habitat and current maximum water surface elevation (m) : _____

Possible Project nexus: _____

Amphibian Species Surveys

Site ID: VES 6

Date: 5/14/14

Team Members: ST & MH

Geographic coordinates

Location: Twin Springs - Lower

County: Malheur Elevation: 3200 ft

Start survey. East UTM: 43.615655534 North UTM: -117.41664335 7

End survey. East UTM: 43.61265768535 North UTM: -117.414485152

Estimated search area. Length (m): 380 m Width (m): 10 m

Survey duration

Survey start time: 11:30 End time: 11:55 Total duration: 25 min

Weather

Weather: Clear Overcast Rain Wind: Calm Light Strong

Temperature (air) Begin: 20°C End: 22°C

Precipitation-- Current: N Last 48 hrs: N Last 10 days: N

Habitat

Slope % and aspect:

COVER EXAMINED

Rocks %: Talus Rock pile Outcrop

Logs %:

Other % (specify):

Overall extent of moss cover %:

Moisture under cover: Dry Moist Free water present

VEGETATION

Upland habitat type: ~~Mixed hardwood conifer~~ Chaparral Ponderosa pine Riparian deciduous Scrub-shrub

Tree species and abundance (A=abundant, C =common, F=few):

Willows / Acacia, Aspen few

Shrub species and abundance (A,C,F):

Sage

Other plant species and abundance (A,C,F):

Reeds, grass, tulle

POTENTIAL HABITAT

Extent of potential habitat at site (area, UTM boundaries): Surveyed area - Extends south of study area

Quality of potential habitat for LS: Excellent Good (Fair) Poor

Photographs

Number	Description	UTM E	UTM N
176	Overview of VES Start (looking N)		
177-8	Overview @ Start (looking S)		
179	trough at Spring		
180	Overview w/ upland grass		
181	Standing pond at end		

Amphibian/reptile species observed

Species	Life stage	SVL (mm)	Microhabitat (type and position on slope)	Comments	Survey method
PSRE	A	35	~2 Adults observed in ponded areas w/ Reeds	Disturbed by grazing	VES

Species codes: Blotched tiger salamander (AMTI), Columbia spotted frog (RALU), Northern leopard frog (RAPI), Western toad (ANBO), Woodhouse toad (BUWO), rough-skinned newt (TAGR), Pacific tree frog (PSRE), and Great Basin spadefoot toad (SCIN).
Microhabitat examples: rock on rock, rock on soil, log on soil, crevice of outcrop

Impacts to amphibian habitat

Current land use: Range

Current surface water elevation: _____

Description of adjacent lands: Range

Distance between suitable limestone salamander habitat and current maximum water surface elevation (m) : _____

Possible Project nexus: _____

Amphibian Species Surveys

Site ID: Wildcat Spring ~~VES 4b~~ VES 7

Date: 5/13/14

Team Members: ST & MIT

Geographic coordinates

Location: Wildcat Spring

County: Malheur Elevation: 3350 ft

Start survey. East UTM: 43.705516 5789 North UTM: -117.428825295

End survey. East UTM: 43.705150 4217 North UTM: -117.430359102

Estimated search area. Length (m): 135 Width (m): 9 m

Survey duration

Survey start time: 5:05 End time: 5:15 Total duration: 10 min

Weather

Weather: Clear Overcast Rain Wind: Calm Light Strong

Temperature (air) Begin: 24°C End: 24° C

Precipitation-- Current: N Last 48 hrs: N Last 10 days: N

Habitat

Slope % and aspect: _____

COVER EXAMINED

Rocks %: _____ Talus Rock pile Outcrop

Logs %: _____

Other % (specify): _____

Overall extent of moss cover %: _____

Moisture under cover: Dry Moist Free water present

VEGETATION

Upland habitat type: Mixed hardwood conifer Chaparral Ponderosa pine Riparian deciduous

Tree species and abundance (A=abundant, C =common, F=few):

None

Shrub species and abundance (A,C,F):

Sage Shrubs

Other plant species and abundance (A,C,F):

Rushes

POTENTIAL HABITAT

Extent of potential habitat at site (area, UTM boundaries): Survey area

Quality of potential habitat for LS: Excellent Good Fair Poor

Photographs

Number	Description	UTM E	UTM N
154	looking N at wildcat spring		
155	looking S at N point of spring		

Amphibian/reptile species observed

Species	Life stage	SVL (mm)	Microhabitat (type and position on slope)	Comments	Survey method
PSRE	L	various	ponded water area ~ 2-3 ft. deep	>100 larval PSRE	

Species codes: Blotched tiger salamander (AMTI), Columbia spotted frog (RALU), Northern leopard frog (RAPI), Western toad (ANBO), Woodhouse toad (BUWO), rough-skinned newt (TAGR), Pacific tree frog (PSRE), and Great Basin spadefoot toad (SCIN).
Microhabitat examples: rock on rock, rock on soil, log on soil, crevice of outcrop

Impacts to amphibian habitat

Current land use: Rangeland

Current surface water elevation: _____

Description of adjacent lands: _____

Distance between suitable limestone salamander habitat and current maximum water surface elevation (m) : _____

Possible Project nexus: _____

Amphibian Species Surveys

Site ID: ~~VES7~~ ~~VES8~~ Pond 1 VES 8

Date: 5/15/14

Team Members: MH & ST

Geographic coordinates

Location: large pond on Twin Spring Rd South of Parson Spring

County: Malheur Elevation: 3275 ft

Start survey. East UTM: 43.690952883 North UTM: -117.394695622

End survey. East UTM: 43.690995757 North UTM: -117.394531615

Estimated search area. Length (m): 475m Width (m): 10m

Survey duration

Survey start time: 12:35 End time: 12:50 Total duration: 15 min

Weather

Weather: (Clear) Overcast Rain Wind: Calm (Light) Strong

Temperature (air) Begin: 20°C End: 22°C

Precipitation-- Current: N Last 48 hrs: N Last 10 days: N

Habitat

Slope % and aspect:

COVER EXAMINED

Rocks %: Talus Rock pile Outcrop

Logs %:

Other % (specify):

Overall extent of moss cover %:

Moisture under cover: Dry Moist Free water present

VEGETATION

Upland habitat type: Mixed hardwood conifer Chaparral Ponderosa pine Riparian deciduous

Tree species and abundance (A=abundant, C =common, F=few):

willows F

Shrub species and abundance (A,C,F):

Sage - Stepe

Other plant species and abundance (A,C,F):

tulle, milfoil (F)

POTENTIAL HABITAT

Extent of potential habitat at site (area, UTM boundaries): 2.06 Acres

Quality of potential habitat for LS: Excellent Good (Fair) Poor

Photographs

Number	Description	UTM E	UTM N
213	Overview		
214-215	Footprints coyote / dog		
216	Midpoint of pond		
217	North bank showing tules / water		

Amphibian/reptile species observed

Species	Life stage	SVL (mm)	Microhabitat (type and position on slope)	Comments	Survey method
			None observed		

Species codes: Blotched tiger salamander (AMTI), Columbia spotted frog (RALU), Northern leopard frog (RAPI), Western toad (ANBO), Woodhouse toad (BUWO), rough-skinned newt (TAGR), Pacific tree frog (PSRE), and Great Basin spadefoot toad (SCIN).
Microhabitat examples: rock on rock, rock on soil, log on soil, crevice of outcrop

Impacts to amphibian habitat

Current land use: Rangeland

Current surface water elevation: _____

Description of adjacent lands: Rangeland

Distance between suitable limestone salamander habitat and current maximum water surface elevation (m) : _____

Possible Project nexus: _____

Amphibian Species Surveys

Site ID: VES 9

Date: Pond 2 5/15/14

Team Members: MH ST

Geographic coordinates

Location: Pond 2

County: Malheur Elevation:

Start survey. East UTM: North UTM:

End survey. East UTM: North UTM:

Estimated search area. Length (m): Width (m):

Survey duration

Survey start time: 1:10 End time: 1:20 Total duration: 10min

Weather

Weather: (Clear) Overcast Rain Wind: (Calm) Light Strong

Temperature (air) Begin: 22°C End: 23°C

Precipitation-- Current: No Last 48 hrs: No Last 10 days: No

Habitat

Slope % and aspect:

COVER EXAMINED

Rocks %: Talus Rock pile Outcrop

Logs %:

Other % (specify):

Overall extent of moss cover %:

Moisture under cover: Dry Moist Free water present

VEGETATION

Upland habitat type: Mixed hardwood conifer Chaparral Ponderosa pine Riparian deciduous

Tree species and abundance (A=abundant, C =common, F=few):

None

Shrub species and abundance (A,C,F):

Sage - steppe

Other plant species and abundance (A,C,F):

Grass

POTENTIAL HABITAT

Extent of potential habitat at site (area, UTM boundaries): Stock pond in ~~ag~~ f grazing

Quality of potential habitat for LS: Excellent Good (Fair) Poor area - mostly dry

Photographs

Number	Description	UTM E	UTM N

Amphibian/reptile species observed

Species	Life stage	SVL (mm)	Microhabitat (type and position on slope)	Comments	Survey method

Species codes: Blotched tiger salamander (AMTI), Columbia spotted frog (RALU), Northern leopard frog (RAPI), Western toad (ANBO), Woodhouse toad (BUWO), rough-skinned newt (TAGR), Pacific tree frog (PSRE), and Great Basin spadefoot toad (SCIN).
Microhabitat examples: rock on rock, rock on soil, log on soil, crevice of outcrop

Impacts to amphibian habitat

Current land use: _____

Current surface water elevation: _____

Description of adjacent lands: _____

Distance between suitable limestone salamander habitat and current maximum water surface elevation (m) : _____

Possible Project nexus: _____

Amphibian Species Surveys

Site ID: VES 10

Date: ~~Whiskey Spring~~ 5/19/14

Team Members: ST & JMH

Geographic coordinates

Location: Whiskey Spring

County: Malheur Elevation:

Start survey. East UTM: North UTM:

End survey. East UTM: North UTM:

Estimated search area. Length (m): Width (m):

Survey duration

Survey start time: 1:15 End time: 1:25 Total duration: 10 min

Weather

Weather: (Clear) Overcast Rain Wind: (Calm) Light Strong

Temperature (air) Begin: 20°C End: 20°C

Precipitation-- Current: No Last 48 hrs: No Last 10 days: No

Habitat

Slope % and aspect:

COVER EXAMINED

Rocks %: Talus Rock pile Outcrop

Logs %:

Other % (specify):

Overall extent of moss cover %:

Moisture under cover: Dry Moist Free water present

VEGETATION

Upland habitat type: Mixed hardwood conifer Chaparral Ponderosa pine Riparian deciduous

Tree species and abundance (A=abundant, C =common, F=few):

None

Shrub species and abundance (A,C,F):

Sage

Other plant species and abundance (A,C,F):

grass

POTENTIAL HABITAT

Extent of potential habitat at site (area, UTM boundaries): As survey - fire used as cattle

Quality of potential habitat for LS: Excellent Good Fair (Poor) watertrough with small flow down slope

Photographs

Number	Description	UTM E	UTM N

Amphibian/reptile species observed

Species	Life stage	SVL (mm)	Microhabitat (type and position on slope)	Comments	Survey method

Species codes: Blotched tiger salamander (AMTI), Columbia spotted frog (RALU), Northern leopard frog (RAPI), Western toad (ANBO), Woodhouse toad (BUWO), rough-skinned newt (TAGR), Pacific tree frog (PSRE), and Great Basin spadefoot toad (SCIN).
Microhabitat examples: rock on rock, rock on soil, log on soil, crevice of outcrop

Impacts to amphibian habitat

Current land use: _____

Current surface water elevation: _____

Description of adjacent lands: _____

Distance between suitable limestone salamander habitat and current maximum water surface elevation (m) : _____

Possible Project nexus: _____

C

Appendix C: Data Forms – October 2014

Amphibian and Macroinvertebrate Surveys

Site ID: VES 1

Date: 10/22/14

Team Members: ST GM

Geographic coordinates

Location: Negro Rock Creek

County: Malheur Elevation:

Start survey. East UTM: North UTM:

End survey. East UTM: North UTM:

Estimated search area. Length (m): Width (m):

Weather

Weather: Clear (Overcast) Rain Wind: (Calm) Light Strong

Temperature (air) Begin: End:

Precipitation-- Current: Last 48 hrs: Last 10 days:

Habitat

STREAM

Slope % and aspect: 0-5%

Is the substrate covered with excessive silt? (Y) / N

Substrate embeddedness in riffles: ___0-25% ___25-50% ___>50% ___Unsure None

Did you observe and fish or wildlife? Y / (N) Describe: Organic matter

VEGETATION

Upland habitat type: Sage - steppe

Shrub species and abundance (A,C,F): Sage

Other plant species and abundance (A,C,F): grass cattails

Amphibian Survey

Survey start time: 2:00 pm End time: 2:45 Total duration:

POTENTIAL HABITAT

Extent of potential habitat at site (area, UTM boundaries):

Quality of potential habitat for LS: Excellent Good (Fair) Poor

Macroinvertebrate Survey None - No flowing streams

Survey start time: End time: Total duration:

___Riffles ___Stream margins ___Submerged wood

___Cobbles ___Leaf packs ___Other (describe:)

___Aquatic plants ___Pools

___Runs ___Undercut banks/Overhanging vegetation

Did you see, but not collect , any live crayfish? Y / (N) or large clams? Y / (N)

Photographs

Number	Description	UTM E	UTM N

Amphibian/reptile species observed

Species	Life stage	SVL (mm)	Microhabitat (type and position on slope)	Comments	Survey method
None					

Species codes: Blotched tiger salamander (AMTI), Columbia spotted frog (RALU), Northern leopard frog (RAPI), Western toad (ANBO), Woodhouse toad (BUWO), rough-skinned newt (TAGR), Pacific tree frog (PSRE), and Great Basin spadefoot toad (SCIN).
Microhabitat examples: rock on rock, rock on soil, log on soil, crevice of outcrop

Impacts to habitat

Current land use: Rangeland

Current surface water elevation: _____

Description of adjacent lands: Same

Amphibian and Macroinvertebrate Surveys

Site ID: VES2

Date: 10/22

Team Members: ST & GMcG

Geographic coordinates

Location: Poison ~~Hollow~~ Springs

County: Malheur Elevation:

Start survey. East UTM: Same as Spring North UTM:

End survey. East UTM: North UTM:

Estimated search area. Length (m): Width (m):

Weather

Weather: Clear (Overcast) Rain Wind: (Calm) Light Strong

Temperature (air) Begin: 56° End: 56°

Precipitation-- Current: None Last 48 hrs: 0.03in Last 10 days: yes

Habitat

STREAM

Slope % and aspect: 0%

Is the substrate covered with excessive silt? (Y) / N

Substrate embeddedness in riffles: ____0-25% ____25-50% ____>50% ____Unsure None

Did you observe and fish or wildlife? Y / (N) Describe: Orthopnic

VEGETATION

Upland habitat type: Sage - Steppe

Shrub species and abundance (A,C,F): Sage

Other plant species and abundance (A,C,F): grass

Amphibian Survey

Survey start time: 3:15 End time: 3:35 Total duration:

POTENTIAL HABITAT

Extent of potential habitat at site (area, UTM boundaries):

Quality of potential habitat for LS: Excellent Good Fair Poor

Macroinvertebrate Survey N/A

Survey start time: End time: Total duration:

____Riffles ____Stream margins ____Submerged wood

____Cobbles ____Leaf packs ____Other (describe:_____)

____Aquatic plants ____Pools

____Runs ____Undercut banks/Overhanging vegetation

Did you see, but not collect , any live crayfish? Y / N , or large clams? Y / N

Photographs

Number	Description	UTM E	UTM N

Amphibian/reptile species observed

Species	Life stage	SVL (mm)	Microhabitat (type and position on slope)	Comments	Survey method

Species codes: Blotched tiger salamander (AMTI), Columbia spotted frog (RALU), Northern leopard frog (RAPI), Western toad (ANBO), Woodhouse toad (BUWO), rough-skinned newt (TAGR), Pacific tree frog (PSRE), and Great Basin spadefoot toad (SCIN).
Microhabitat examples: rock on rock, rock on soil, log on soil, crevice of outcrop

Impacts to habitat

Current land use: _____

Current surface water elevation: _____

Description of adjacent lands: _____

Amphibian and Macroinvertebrate Surveys

Site ID: VES 3

Date: 10/23/14

Team Members: ST GMcG

Geographic coordinates

Location: ~~Alaska~~ Sourdough Gulch

County: Malheur Elevation:

Start survey. East UTM: Same as Spring North UTM:

End survey. East UTM: North UTM:

Estimated search area. Length (m): Width (m):

Weather

Weather: Clear (Overcast) Rain Wind: Calm (Light) Strong

Temperature (air) Begin: 56 End: 57

Precipitation-- Current: X Last 48 hrs: X Last 10 days: X

Habitat

STREAM

Slope % and aspect: 5%

Is the substrate covered with excessive silt? Y (N) Organic matter

Substrate embeddedness in riffles: X 0-25% ___ 25-50% ___ >50% ___ Unsure

Did you observe and fish or wildlife? Y (N) Describe:

VEGETATION

Upland habitat type: Sage

Shrub species and abundance (A,C,F): Sage grass

Other plant species and abundance (A,C,F):

Amphibian Survey

Survey start time: 10:53 End time: 11:15 Total duration:

POTENTIAL HABITAT

Extent of potential habitat at site (area, UTM boundaries):

Quality of potential habitat for LS: Excellent Good (Fair) Poor

Macroinvertebrate Survey N/A

Survey start time: End time: Total duration:

___Riffles ___Stream margins ___Submerged wood

___Cobbles ___Leaf packs ___Other (describe:)

___Aquatic plants ___Pools

___Runs ___Undercut banks/Overhanging vegetation

Did you see, but not collect , any live crayfish? Y / N , or large clams? Y / N

Photographs

Number	Description	UTM E	UTM N

Amphibian/reptile species observed

Species	Life stage	SVL (mm)	Microhabitat (type and position on slope)	Comments	Survey method

Species codes: Blotched tiger salamander (AMTI), Columbia spotted frog (RALU), Northern leopard frog (RAPI), Western toad (ANBO), Woodhouse toad (BUWO), rough-skinned newt (TAGR), Pacific tree frog (PSRE), and Great Basin spadefoot toad (SCIN).
Microhabitat examples: rock on rock, rock on soil, log on soil, crevice of outcrop

Impacts to habitat

Current land use: _____

Current surface water elevation: _____

Description of adjacent lands: _____

Amphibian and Macroinvertebrate Surveys

Site ID: VES 4

Date: 10/23/14

Team Members: ST GM & G

Geographic coordinates

Location: Bull Spring

County: Malheur Elevation:

Start survey. East UTM: Same as Spring North UTM:

End survey. East UTM: North UTM:

Estimated search area. Length (m): Width (m):

Weather

Weather: Clear (Overcast) (Rain) Wind: Calm (Light) Strong

Temperature (air) Begin: 57 End: 57°F

Precipitation-- Current: X Last 48 hrs: X Last 10 days: X

Habitat

STREAM

Slope % and aspect: 5-10%

Is the substrate covered with excessive silt? (Y) (N)

Substrate embeddedness in riffles: X 0-25% ___25-50% ___>50% ___Unsure

Did you observe and fish or wildlife? Y (N) Describe:

VEGETATION

Upland habitat type: Sage

Shrub species and abundance (A,C,F): Grass Reeds

Other plant species and abundance (A,C,F):

Amphibian Survey

Survey start time: 12.15 End time: 12:25 Total duration:

POTENTIAL HABITAT

Extent of potential habitat at site (area, UTM boundaries):

Quality of potential habitat for LS: Excellent Good (Fair) Poor

Macroinvertebrate Survey N/A

Survey start time: End time: Total duration:

___Riffles ___Stream margins ___Submerged wood
___Cobbles ___Leaf packs ___Other (describe:)
___Aquatic plants ___Pools
___Runs ___Undercut banks/Overhanging vegetation

Did you see, but not collect , any live crayfish? Y / N , or large clams? Y / N

Photographs

Number	Description	UTM E	UTM N

Amphibian/reptile species observed

Species	Life stage	SVL (mm)	Microhabitat (type and position on slope)	Comments	Survey method

Species codes: Blotched tiger salamander (AMTI), Columbia spotted frog (RALU), Northern leopard frog (RAPI), Western toad (ANBO), Woodhouse toad (BUWO), rough-skinned newt (TAGR), Pacific tree frog (PSRE), and Great Basin spadefoot toad (SCIN).
Microhabitat examples: rock on rock, rock on soil, log on soil, crevice of outcrop

Impacts to habitat

Current land use: _____

Current surface water elevation: _____

Description of adjacent lands: _____

Amphibian and Macroinvertebrate Surveys

Site ID: VES 5

Date: 10/24/14

Team Members: ST GMcG

Geographic coordinates

Location: Twin Spring North

County: Malheur Elevation:

Start survey. East UTM: Same as Spring North UTM:

End survey. East UTM: North UTM:

Estimated search area. Length (m): Width (m):

Weather

Weather: Clear (Overcast) Rain Wind: Calm (Light) Strong

Temperature (air) Begin: 52 End: 52

Precipitation-- Current: X Last 48 hrs: X Last 10 days: X

Habitat

STREAM

Slope % and aspect: 0-5%

Is the substrate covered with excessive silt? Y / N

Substrate embeddedness in riffles: ____0-25% ____25-50% ____>50% ____Unsure

Did you observe and fish or wildlife? Y / (N) Describe:

VEGETATION

Upland habitat type: Sage cottonwood

Shrub species and abundance (A,C,F): grass sage

Other plant species and abundance (A,C,F):

Amphibian Survey

Survey start time: 10:50 End time: 11:35 Total duration:

POTENTIAL HABITAT

Extent of potential habitat at site (area, UTM boundaries):

Quality of potential habitat for LS: Excellent Good (Fair) Poor

Macroinvertebrate Survey

Survey start time: End time: Total duration:

____Riffles ____Stream margins ____Submerged wood
____Cobbles ____Leaf packs ____Other (describe:)
____Aquatic plants ____Pools
____Runs ____Undercut banks/Overhanging vegetation

Did you see, but not collect , any live crayfish? Y / N , or large clams? Y / N

Photographs

Number	Description	UTM E	UTM N

Amphibian/reptile species observed

Species	Life stage	SVL (mm)	Microhabitat (type and position on slope)	Comments	Survey method

Species codes: Blotched tiger salamander (AMTI), Columbia spotted frog (RALU), Northern leopard frog (RAPI), Western toad (ANBO), Woodhouse toad (BUWO), rough-skinned newt (TAGR), Pacific tree frog (PSRE), and Great Basin spadefoot toad (SCIN).
Microhabitat examples: rock on rock, rock on soil, log on soil, crevice of outcrop

Impacts to habitat

Current land use: _____

Current surface water elevation: _____

Description of adjacent lands: _____

Amphibian and Macroinvertebrate Surveys

Site ID: VF6 6

Date: 10/24/14

Team Members: ST & GMcC

Geographic coordinates

Location: Twin Springs S

County: Malheur Elevation:

Start survey. East UTM: Same as Spring North UTM:

End survey. East UTM: North UTM:

Estimated search area. Length (m): Width (m):

Weather

Weather: Clear (Overcast) Rain Wind: Calm (Light) Strong

Temperature (air) Begin: 53 End: 53

Precipitation-- Current: X Last 48 hrs: X Last 10 days: X

Habitat

STREAM

Slope % and aspect: 0-5%

Is the substrate covered with excessive silt? (Y) / N

Substrate embeddedness in riffles: (0-25%) ___25-50% ___>50% ___Unsure

Did you observe and fish or wildlife? (Y) / N Describe: Jack Rabbit

VEGETATION

Upland habitat type: Sage cottonwood

Shrub species and abundance (A,C,F): Sage

Other plant species and abundance (A,C,F): grass

Amphibian Survey

Survey start time: 11:35 End time: 11:50 Total duration:

POTENTIAL HABITAT

Extent of potential habitat at site (area, UTM boundaries):

Quality of potential habitat for LS: Excellent Good (Fair) Poor

Macroinvertebrate Survey

Survey start time: End time: Total duration:

___Riffles ___Stream margins ___Submerged wood
___Cobbles ___Leaf packs ___Other (describe:)
___Aquatic plants ___Pools
___Runs ___Undercut banks/Overhanging vegetation

Did you see, but not collect, any live crayfish? Y / N, or large clams? Y / N

Photographs

Number	Description	UTM E	UTM N

Amphibian/reptile species observed

Species	Life stage	SVL (mm)	Microhabitat (type and position on slope)	Comments	Survey method

Species codes: Blotched tiger salamander (AMTI), Columbia spotted frog (RALU), Northern leopard frog (RAPI), Western toad (ANBO), Woodhouse toad (BUWO), rough-skinned newt (TAGR), Pacific tree frog (PSRE), and Great Basin spadefoot toad (SCIN).
Microhabitat examples: rock on rock, rock on soil, log on soil, crevice of outcrop

Impacts to habitat

Current land use: _____

Current surface water elevation: _____

Description of adjacent lands: _____

Amphibian and Macroinvertebrate Surveys

Site ID: ~~VES~~ VES 7

Date: 10/22/14

Team Members: ST GMcG

Geographic coordinates

Location: Wildcat Springs

County: Malheur Elevation:

Start survey. East UTM: Same as Spring North UTM:

End survey. East UTM: North UTM:

Estimated search area. Length (m): Width (m):

Weather

Weather: Clear (Overcast) Rain Wind: (Calm) Light Strong

Temperature (air) Begin: 64° End: 64°F

Precipitation-- Current: ~~Rain~~ Last 48 hrs: X Last 10 days: X

Habitat

STREAM

Slope % and aspect: 0-5%

Is the substrate covered with excessive silt? (Y) / N

Substrate embeddedness in riffles: X 0-25% ___25-50% ___>50% ___Unsure

Did you observe and fish or wildlife? Y / (N) Describe: Low flow seep

VEGETATION

Upland habitat type: Sage - steppe

Shrub species and abundance (A,C,F): Sage

Other plant species and abundance (A,C,F): grass

Amphibian Survey

Survey start time: 3:55 End time: 4:08 Total duration:

POTENTIAL HABITAT

Extent of potential habitat at site (area, UTM boundaries):

Quality of potential habitat for LS: Excellent Good (Fair) Poor

Macroinvertebrate Survey N/A

Survey start time: End time: Total duration:

___Riffles ___Stream margins ___Submerged wood

___Cobbles ___Leaf packs ___Other (describe:)

___Aquatic plants ___Pools

___Runs ___Undercut banks/Overhanging vegetation

Did you see, but not collect , any live crayfish? Y / N , or large clams? Y / N

Photographs

Number	Description	UTM E	UTM N

Amphibian/reptile species observed

Species	Life stage	SVL (mm)	Microhabitat (type and position on slope)	Comments	Survey method

Species codes: Blotched tiger salamander (AMTI), Columbia spotted frog (RALU), Northern leopard frog (RAPI), Western toad (ANBO), Woodhouse toad (BUWO), rough-skinned newt (TAGR), Pacific tree frog (PSRE), and Great Basin spadefoot toad (SCIN).
Microhabitat examples: rock on rock, rock on soil, log on soil, crevice of outcrop

Impacts to habitat

Current land use: _____

Current surface water elevation: _____

Description of adjacent lands: _____

Amphibian and Macroinvertebrate Surveys

Site ID: VES #8

Date: 10/22/14

Team Members: ST GMcG

Geographic coordinates

Location: ~~[illegible]~~ Pond 1

County: Malheur Elevation:

Start survey. East UTM: Same as Spring North UTM:

End survey. East UTM: North UTM:

Estimated search area. Length (m): Width (m):

Weather

Weather: Clear Overcast Rain Wind: Calm Light Strong

Temperature (air) Begin: 56 End: 56

Precipitation-- Current: Last 48 hrs: X Last 10 days: X

Habitat

STREAM

Slope % and aspect: 0%

Is the substrate covered with excessive silt? (Y) / N

Substrate embeddedness in riffles: X 0-25% 25-50% >50% Unsure

Did you observe and fish or wildlife? Y / (N) Describe:

VEGETATION

Upland habitat type: Sage Beaver willow

Shrub species and abundance (A,C,F):

Other plant species and abundance (A,C,F): Agrass cattails

Amphibian Survey

Survey start time: 4:26 End time: 4:44 Total duration:

POTENTIAL HABITAT

Extent of potential habitat at site (area, UTM boundaries):

Quality of potential habitat for LS: Excellent (Good) Fair Poor

Macroinvertebrate Survey N/A

Survey start time: End time: Total duration:

___Riffles ___Stream margins ___Submerged wood

___Cobbles ___Leaf packs ___Other (describe:)

___Aquatic plants ___Pools

___Runs ___Undercut banks/Overhanging vegetation

Did you see, but not collect , any live crayfish? Y / N , or large clams? Y / N

Photographs

Number	Description	UTM E	UTM N

Amphibian/reptile species observed

Species	Life stage	SVL (mm)	Microhabitat (type and position on slope)	Comments	Survey method

Species codes: Blotched tiger salamander (AMTI), Columbia spotted frog (RALU), Northern leopard frog (RAPI), Western toad (ANBO), Woodhouse toad (BUWO), rough-skinned newt (TAGR), Pacific tree frog (PSRE), and Great Basin spadefoot toad (SCIN).
Microhabitat examples: rock on rock, rock on soil, log on soil, crevice of outcrop

Impacts to habitat

Current land use: _____

Current surface water elevation: _____

Description of adjacent lands: _____

Amphibian and Macroinvertebrate Surveys

Site ID: VES 9

Date: 10/23/14 - Dry pond

Team Members: ST GMcG

Geographic coordinates

Location: ~~[illegible]~~ Pond 2

County: Malheur Elevation:

Start survey. East UTM: Same as Spring North UTM:

End survey. East UTM: North UTM:

Estimated search area. Length (m): Width (m):

Weather

Weather: Clear (Overcast) Rain Wind: Calm (Light) Strong

Temperature (air) Begin: 5 End: 5

Precipitation-- Current: X Last 48 hrs: X Last 10 days: X

Habitat

STREAM

Slope % and aspect: 0-5 W

Is the substrate covered with excessive silt? Y / N N/A - Dry

Substrate embeddedness in riffles: ____0-25% ____25-50% ____>50% ____Unsure

Did you observe and fish or wildlife? Y / N Describe:

VEGETATION

Upland habitat type: Sage - Steppe

Shrub species and abundance (A,C,F):

Other plant species and abundance (A,C,F): Grass

Amphibian Survey

Survey start time: 10:20 End time: 10:25 Total duration:

POTENTIAL HABITAT

Extent of potential habitat at site (area, UTM boundaries):

Quality of potential habitat for LS: Excellent Good Fair (Poor)

Macroinvertebrate Survey

Survey start time: End time: Total duration:

____Riffles ____Stream margins ____Submerged wood
____Cobbles ____Leaf packs ____Other (describe:_____)
____Aquatic plants ____Pools
____Runs ____Undercut banks/Overhanging vegetation

Did you see, but not collect , any live crayfish? Y / N , or large clams? Y / N

Photographs

Number	Description	UTM E	UTM N

Amphibian/reptile species observed

Species	Life stage	SVL (mm)	Microhabitat (type and position on slope)	Comments	Survey method

Species codes: Blotched tiger salamander (AMTI), Columbia spotted frog (RALU), Northern leopard frog (RAPI), Western toad (ANBO), Woodhouse toad (BUWO), rough-skinned newt (TAGR), Pacific tree frog (PSRE), and Great Basin spadefoot toad (SCIN).
Microhabitat examples: rock on rock, rock on soil, log on soil, crevice of outcrop

Impacts to habitat

Current land use: _____

Current surface water elevation: _____

Description of adjacent lands: _____

Amphibian and Macroinvertebrate Surveys

Site ID: VES 10

Date: 10/24/14

Team Members: ST GMcG

Geographic coordinates

Location: Whitney Spring

County: Malheur Elevation:

Start survey. East UTM: Same as Spring North UTM:

End survey. East UTM: North UTM:

Estimated search area. Length (m): Width (m):

Weather

Weather: Clear (Overcast) Rain Wind: Calm (Light) Strong

Temperature (air) Begin: 51 End: 51

Precipitation-- Current: X Last 48 hrs: X Last 10 days: X

Habitat

STREAM

Slope % and aspect: 10-15%

Is the substrate covered with excessive silt? (Y) / N

Substrate embeddedness in riffles: X 0-25% ___25-50% ___>50% ___Unsure

Did you observe and fish or wildlife? Y /(N) Describe:

VEGETATION

Upland habitat type: Sage

Shrub species and abundance (A,C,F): Sage / grass

Other plant species and abundance (A,C,F):

Amphibian Survey

Survey start time: 10:20 End time: 10:30 Total duration:

POTENTIAL HABITAT

Extent of potential habitat at site (area, UTM boundaries):

Quality of potential habitat for LS: Excellent Good (Fair) Poor

Macroinvertebrate Survey

Survey start time: End time: Total duration:

___Riffles ___Stream margins ___Submerged wood
___Cobbles ___Leaf packs ___Other (describe:)
___Aquatic plants ___Pools
___Runs ___Undercut banks/Overhanging vegetation

Did you see, but not collect , any live crayfish? Y / N , or large clams? Y / N

Photographs

Number	Description	UTM E	UTM N

Amphibian/reptile species observed

Species	Life stage	SVL (mm)	Microhabitat (type and position on slope)	Comments	Survey method

Species codes: Blotched tiger salamander (AMTI), Columbia spotted frog (RALU), Northern leopard frog (RAPI), Western toad (ANBO), Woodhouse toad (BUWO), rough-skinned newt (TAGR), Pacific tree frog (PSRE), and Great Basin spadefoot toad (SCIN).
Microhabitat examples: rock on rock, rock on soil, log on soil, crevice of outcrop

Impacts to habitat

Current land use: _____

Current surface water elevation: _____

Description of adjacent lands: _____