CES
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Baseline Biological Survey Report

Empire Mine

Konnex Resources Inc.
Mackay, Idaho
September 2017

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1.0 INTRODUCTION

Cascade Earth Scientists (CES) performed a baseline biological resource assessment of an area surrounding the Empire Mine for Konnex Resources, Inc. in June 2017 (Figure 1). The Project Area is located in the White Knob Mountains west of Mackay in Custer County, Idaho. The Project Area is located in portions of Township 6 North, Range 23 E and Township 7 North, Range 23E and depicted on the Mackay Reservoir 7.5- minute Quadrangle (USGS, 2011). The Project Area boundary is approximately 700 acres, which includes a 500-foot buffer surrounding patented claims (Figure 2). The Project Area is located near the eastern edge of the Salmon-Challis National Forest, which adjoins federal land managed by the Bureau of Land Management (BLM).

CES was retained to by Konnex to complete the following work:

1. Pre-field desktop research and agency consultation to compile vegetation and wildlife species and wetland delineation (completed).
2. Summer field surveys: sensitive plants and weed mapping, wetland delineation and mapping, wildlife point count surveys for avian species and other wildlife surveys.
3. Winter wildlife track surveys (will be scheduled after snow cover is established)
4. Reports to summarize findings of each field survey, which includes this report covering vegetation surveys, one of two wildlife survey reports, and a wetland delineation report.

This report presents the methodology and results from the following baseline biological surveys performed within the Project Area:

- Vegetation community mapping
- Floristic inventory
- Noxious weeds and invasive, non-native species survey
- Special status plant species survey
- Wetland delineation of Horseshoe Canyon
- General wildlife and game species survey
- Special Status wildlife species survey
- Migratory bird point count survey

1.1 Agency Consultation

Resource specialists in all of the federal and state agencies who administer adjacent public lands were contacted regarding rare, sensitive, federally listed, and Idaho Natural Heritage Program tracked vegetation and wildlife species known to occur within Custer County, Idaho, near the Empire Mine area. These personnel are listed in Appendix A. Guidance on developing an appropriate sensitive species list for both vegetation and wildlife species to use for inventories was provided by Lynn Kinter of the Idaho Fish and Game; Mark Howell, a wildlife biologist with the BLM Challis, ID office; Jim Strickland, Idaho Fish and Game and the Idaho Natural Heritage

Program; Rose Lehman of the USFS. This information was used to develop a list of target special status plant species to include in the survey. A list of the agency personnel who provided responses is included in Appendix A. If requested, copies of the lists provided will be made available.

- U.S. Forest Service consultation
- Bureau of Land Management consultation
- Idaho Natural Heritage Program tracked species for Custer County
- Rare, threatened, and endangered listings from the Idaho Fish and Wildlife Information System
- NatureServe tracked wildlife and vegetation species of concern (SOC)
- Idaho Department of Fish and Game state plant list by region for special status plant species occurring in or near the Project Area
- Idaho Fish and Game consultation on appropriate buffers for avian point counts from drilling sites
- U.S. Army Corps of Engineers: Permitting for impacts to wetlands and other aquatic habitats is handled by the Regulatory Program of the local U.S. Army Corps of Engineers District

For the proposed protocol-level field survey, CES gathered baseline biological resource information within the Project Area (Figure 2). CES collected floristic and wildlife data, and performed surveys for federally and state listed threatened, endangered, or candidate plant and wildlife species, as well as BLM special status plant and wildlife species. Avian point counts were conducted to account for potential migratory birds, as well as SO).

1.2 General Survey Methods

Prior to the onset of field surveys, Konnex Resources (Ryan McDermott) provided CES with a tour of the Project Area, including the Cossack Tunnel and compressor building at the 1600-foot level, the open pit mine site, the aerial tramway headhouse at the 700-foot level, cooling pond locations, access roads, and areas where adits (Photo 1 in Appendix B) and overburden piles could prove hazardous to walk nearby. Adits and future drilling sites had been surveyed and flagged prior to the CES surveys.

CES utilized the survey markings (flagged stakes) on adit areas and GPS receivers to locate the various elements of areas where extra caution was needed in walking. The past mining sites were then carefully surveyed utilizing pedestrian transects. The pedestrian transects observed conditions for 30 feet on each side of centerline. Two CES surveyors walked transects through the locations designated as safe. The general vegetation types present in the area of each facility were recorded. Observations of wildlife and wildlife signs (tracks, burrows, scats) were noted. The various elements of the proposed project were also surveyed for the presence of threatened, endangered, or candidate, state listed (TEC/S) species. In addition to dedicated searches for TEC/S species, the possible suitable habitats present in each area of each project and along access roads were assessed for their potential to support TEC/S species, where possible.

Much of the Project Area is steeper than 30 percent slopes, so access to all areas was not possible. The steepness of slopes and past mining hazards were overcome by focusing surveys on the many trails and roads that cross cut the project and the few flat areas, and careful planning using topographic maps and orienteering traverses down the ridges and drainage bottoms to avoid the steep side slopes and unstable adit areas (Figure 3).

For areas that were inaccessible due to terrain, systematic and careful ocular surveys were conducted using binoculars from nearby vantage points. Survey intensity was defined as a pedestrian or ocular survey that used systematic routes and careful observation to ensure the Project Area was inspected. The Project Area, including roads, were surveyed for raptors, but raptor surveys were not conducted outside of the Project Area. GPS units were used to record the locations where any TEC/S species occurred in, or near, the Project Area.

Surveys were conducted using a GPS and the Avenza application (http://www.avenza.com/avenza-maps) to record place markers and photos with specific vegetation features (Appendix B). Photo-point data was recorded using the Solocator application (http://solocator.com/). The photos taken at key sites were stamped with elevation, GPS Coordinates, compass direction and bearing, date and time overlays. Aspect can be determined from the compass bearings in the photos. Slope was noted for each photo.

2.0 PROJECT AREA CHARACTERISTICS

The Project Area topography, geologic setting, soils, climate, ecological setting, and flora were compiled from published resources to provide context for the biological surveys.

2.1 Topography

The Project Area has high topographic relief that is typical of the Basin and Range province. The highest peaks of the White Knob mountain range exceed 11,000 feet in elevation. The Lost River Range is the next range east of the Project Area, which includes the tallest peak in the state (Borah Peak – 12,600 feet). The Big Lost River valley has an elevation of 5,900 feet. Slopes above the Project Area, along the ridgelines, are moderate to very steep. Most of the Project Area comprises slopes of 30 to 75 percent (Figure 3).

Watersheds in the mountain ranges drain into the Big Lost River, which flows southward until it infiltrates into the porous basalt of the Snake River Plain. There was only one drainage observed in the Project Area during the June 2017 surveys. Horseshoe Canyon had a small amount of surface water flow in it from the higher elevations outside of the Project Area to a point in Rio Grande Canyon along Mine Road just above the Cossack Tunnel (Figure 2). Cliff Creek flows east through US Forest Service (USFS) property south of the Project Area.

2.2 Geologic Setting

East-central Idaho lies within the Cordilleran fold and thrust belt and in the Basin-and-Range province. Rocks and structures within this region reflect a long and complex history of deformation.

The Project Area is in the southwest corner of the White Knob Mountains that has copper skarn deposits, related to the Eocene White Knob granite, which were productive from 1907 into the 1970s (Nelson and Ross, 1968; Wilson et al., 1995). The Project Area is near the northeast end of a northeast-trending horst of Paleozoic rocks in the White Knob Mountains. The Eocene White Knob intrusive suite and northeast-trending dike swarms occupy the central axis of the horst and invade the Mississippian McGowan Creek Formation and White Knob Limestone (Nelson and Ross, 1968 and 1969; Snider, 1995). Eocene Challis volcanic rocks, which underlie most of the lower foothills in the hanging wall of the horst south of the Empire Mine, were deposited across an irregular erosion surface cut into folded upper Paleozoic carbonate rocks (Snider, 1995).

2.3 Soils

Soils in the majority of the Project Area, except near the northeast corner of the Project Area, near the Cossack Tunnel, have not been characterized (Appendix C). There are six soil units east of the Project Area. The survey corridor from the upper elevations of the Empire Mine descends to the northeast into the Big Lost River Valley.

All of the known soils in the area are mollisols, within the following units:

- 79, Gany Gravelly Loam, 30 to 60 percent slopes
- 95, Ike-Rock Outcrop-Jimbee Complex, 15 to 60 percent slopes
- 96, Inferno-Grouseville Association, 15 to 50 percent slopes
- 97, Jimbee-Rock Outcrop-Ike Association, 30 to 75 percent slopes
- 190, Simeroi gravelly loam, 6 to 15 percent slopes
- 244, Zeale-Meegero Complex, 20 to 40 percent slopes

Mollisols are one of the 12 soil orders in the U.S. soil taxonomy system. Mollisols form in semi-arid to semi-humid climates and are characterized as having a dark humus-rich surface layer that almost always forms under grassland vegetation.

Only one currently mapped soil, Gany Gravelly Loam, occurs within the project boundaries (Appendix C). It is mapped in northeast corner of the Project Area, near Cossack tunnel. Soils tested for hydric soil characteristics in the Horseshoe Canyon drainage are dark mollisols.

Some of the soil units are soil associations that consist of one or more major soils and some minor soils or miscellaneous areas. Four of the National Resource Conservation Service (NRCS) soil map units listed above are associations mapped at the Order 3 level. These map units are composed of up to three major soils. During the NRCS mapping process, it was not considered practical or necessary to separate individual soil types, so associations are shown as one unit on the NRCS soil maps.

2.4 Ecological Setting

The Empire Mine Project Area is located in the Challis Volcanics Ecological Section (USFS, 1994). This section is dominated by mountain ranges, including the White Cloud Peaks, Pioneer Mountains, Smoky Mountains, Boulder Mountains, White Knob Mountains and portions of the Salmon River Range. There are some glaciated areas. Major water bodies include the Wood River, Big Lost River, and Salmon River, as well as many perennial streams and alpine lakes. Elevation ranges from 1,200-3,600 meters (4,000-11,800 feet). Approximately half of the land in the region is forested and major land uses are timber harvest, livestock grazing, and recreation. Mining for copper, gold, and silver is also an important use.

Climate is influenced by prevailing winds from the west and the general north–south orientation of the mountain ranges. Precipitation in the section ranges from 25-120 centimeters (10 to 45 inches), annually, with an average of 56 centimeters (22 inches). A majority of precipitation occurs throughout the fall, winter, and spring. A rain shadow effect from the high mountain barriers to the west reduces precipitation in this section. Summers are dry with low humidity. Much of the precipitation that falls at lower elevations during summer months evaporates. The average annual air temperature is 3-10°C (34 to 50°F) but may be as low as -4°C (24°F) in the high mountains. The growing season ranges from 70 to 120 days.

The White Knob Mountains are a high and dry range located between the Big Lost River Valley and Copper Basin in east-central Idaho. The range is quite compact and is only about 30 miles long and 10 miles wide. The mountain peaks are open and mostly treeless (Photo 2 in Appendix B). A great deal of the range is also above the tree line, further contributing to its open nature.

Where there are trees, Douglas fir (*Pseudotsuga menzeisii*) makes up the majority with occasional Limber pines (*Pinus flexilis*) and Engelmann spruce (*Picea engelmannii*) trees. There are also small pockets of Aspens (*Populus tremuloides*) and a generous amount of Mountain mahogany (*Cercocarpus ledifolius*) covering the lower elevation slopes. Sagebrush (Artemisia spp.) is the dominant plant cover at the lower elevations of the Project Area (Photo 3 in Appendix B).

Elevations in the Project Area range from approximately 6,910 feet above mean sea level (amsl) near the Cossack Tunnel to 9,100 feet amsl at the highest elevations of the Project Area south of the main open pit (Figure 2). 30-year normal monthly and annual precipitation and temperature values for the Project Area are listed in Table 1.

2.5 Floristic Description of the Empire Mine Project Area and Special Status Species

The Project Area is located within the Intermountain Region, Northern Rocky Mountain Physiographic Province, East Central Mountains Division, Pioneer/Boulder Unit which includes the Idaho Challis Volcanics Section floristic zone as described by Barbara Etter of the California Jepson Herbarium and Mosely (1992). Most of the vegetation community types belong to Northern Rocky Mountain subalpine deciduous shrubland or Middle Rocky Mountain Steppe – Coniferous Forest – Alpine Meadows.

The most important supplementary information used in analysis and delineation of floristic regions was geology: the primary determinant of plant distribution. Substrate, physiography, and geological history all have direct effects on vegetation and are major determiners of soil type and climate.

In contrast to the granitic uniformity of the Idaho Batholith, the geology of east-central Idaho is a complex mixture of Precambrian and Paleozoic marine sediments and metamorphics, Tertiary volcanics, and, in the valleys, Quaternary continental sediments. The mountains are generally higher than elsewhere in Idaho, and include the highest elevation: Borah Peak. In the west, the named mountain ranges are not particularly distinct, while in the eastern half, the parallel ranges and valleys are prominently defined. The seismic activity generally associated with such topography was spectacularly evident in 1983, in the form of the Borah Peak earthquake: 7.3 on the Richter scale.

As a result of both the geologic and topographic diversity, this division is a floristically rich section of Idaho. Therefore, it has been the focus of ongoing botanical exploration. Floristic characteristics include the occurrence of several arctic-alpine disjuncts, such as *Papaver kluaense* D. Love. Several Great Plains species also enter Idaho in this division, e.g., *Astragalus bisulcatus* (Hook.) Gray.

The Pioneer/Boulder Unit (ECpb) includes the Boulder, Pioneer, White Cloud, Smoky, and White Knob mountains. Endemic taxa include *Astragalus vexillifiexus* Sheld. var. *nubilus* Barneby in the White Clouds. The Kane Lake area in the Pioneer Mountains has recently gained interest for the number of arctic-alpine disjuncts it harbors (e.g., *Draba fladnizensis* Wulfen) that require more mesic conditions than are generally found in the east-central mountains. (Etter and Moseley, 1992).

3.0 VEGETATION SURVEY

A vegetation survey was conducted at the Project Area, including pre-field desktop research, vegetation community mapping, floristic inventory (Section 2.5), special status plant species survey, and noxious weeds and invasive, non-native species survey.

3.1 Broad-Scale General Plant Community Types

A master list of all the vegetation classes found in the study area was developed based upon the US Geological Survey (USGS) GAP vegetation map (Figure 4). Descriptions of the vegetation classes were developed from field observations and later compared with NatureServe ecological community designations for states, ecoregions, or map zones.

Four, broad-scale, general plant community types occur within the boundary of the Project Area. Two of these fall into categories within the plant ecological community classification used by NatureServe (2017) of Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest. Two more plant community types fall into the category of woodland/shrubland types.

NatureServe Explorer reports information on ecological communities and systems as defined for terrestrial ecosystems from all 50 of the United States through their Natural Heritage Programs. Developed by NatureServe and its natural heritage member programs in each state in collaboration with federal, international, academic, and state partners, these classifications provide a systematic

way of describing and assessing ecological diversity. They address the need for subnational, national and international classification standards for ecosystems, while allowing for classification at a scale fine enough to be used to understand, manage, and protect natural resources on a local or site-by-site basis (NatureServe, 2017).

Four of the large-scale vegetation communities within the Project Area fall within NatureServe's designations of community types. These cover classifications occupy almost all of the area within the project boundary. The two plant community types that are included within Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest are listed below.

3.1.1 Pseudotsuga menziesii/Symphoricarpos oreophilus (Douglas-fir/Mountain Snowberry) Forest

This is the most common forest association occurs within the Project Area. It occurs on foothills and steep, mountain slopes within the Project Area (Photos 4 and 5 in Appendix B). Elevations range from 6,300 – 8,500 feet, mostly as an upland community, although there are Douglas fir that encroach into the narrow riparian zone of Horseshoe Canyon. It was observed occurring on steep, north-facing slopes in narrow canyons on the mine property where dense shade and steepness preclude any significant shrub or herbaceous understory. It occurs on the northern aspects with moderate to very steep mid and upper slopes and ridges (Photo 4 in Appendix B). Soils are variable and appear to range from deep silt loam to shallow, rocky substrates.

Most stands have abundant litter on the ground and some have high rock cover. The vegetation is characterized by a relatively sparse to dense evergreen tree canopy dominated by *Pseudotsuga menziesii*, sometimes with scattered individuals or small stands of *Pinus flexilis, Populus tremuloides, Juniperus scopulorum*, or *Juniperus communis*, especially on drier sites. *Symphoricarpos oreophilus* dominates the sparse to moderately dense short-shrub layer. Shrub associates vary depending on slope and aspect and include *Amelanchier* spp., *Artemisia tridentata ssp. vaseyana, Cercocarpus ledifolius, Juniperus communis, Mahonia repens, Prunus virginiana, Ribes cereum,* and *Ribes inerme.* The generally sparse herbaceous layer is composed of mostly graminoids with scattered forbs.

This association occurs over a wide range of environmental conditions. Where precipitation, soil moisture, and temperature are adequate, it occurs as an upland association. Where it occurs as a riparian forest, it is limited to very narrow canyon bottoms, such as Horseshoe Canyon, where narrow canyons with steep slopes create pockets of cool, moist air by funneling cold air downwards, thus providing a microsite for *Pseudotsuga menziesii* (Kittel et al., 1999a). Often the coarse colluvial substrates provide deep moisture for trees and shrubs but little moisture for an herbaceous layer. Most of the denser stands of Douglas fir on the Project Area have a very sparse understory.

3.1.2 Populus tremuloides - Pseudotsuga menziesii/Symphoricarpos oreophilus (Quaking Aspen-Douglas fir/Mountain snowberry) Forest

This forest association occurs only in a small section of the Project Area. It forms a minor component of the forested vegetation communities in the Project Area. This is probably due to the dryness of this area, as aspen needs abundant moisture to maintain itself on the landscape. Most stands occur between 1,800 and 2,300 meters (6,000-7,500 feet) elevation on gentle to steep slopes,

on all aspects, primarily on soils derived from sedimentary parent materials. The tree layer is a mixture of *Populus tremuloides* and *Pseudotsuga menziesii*. Occasionally, *Abies lasiocarpa* may be present but not abundant. The undergrowth is characterized by the low stratum of *Symphoricarpos oreophilus* and *Rosa woodsii*. The herbaceous layer is minor and includes *Elymus glaucus, Calamagrostis rubescens,* and *Carex geyeri*. Forbs present may include *Arnica cordifolia, Thalictrum fendleri, Osmorhiza berteroi (Osmorhiza chilensis)*, and *Geranium viscosissimum.*

3.1.3 Cercocarpus ledifolius/Festuca idahoensis/Hesperostipa comata (Curl-leaf Mountain-mahogany/Idaho Fescue) Woodland

Found on moderate to steep, rocky and north-facing slopes of varying parent materials; elevations range upward from 6,300 feet to at least 9,000 feet within the Project Area. It occurs on comparable settings in the Challis Volcanics and Idaho Batholith sections of central Idaho. This association occurs on steep south-facing slopes on hillsides where the north-facing slope is covered in Douglas fir, and on steep slopes composed of limestone sedimentary colluvium, which weathers to shallow, poorly developed and excessively drained soils.

Cercocarpus ledifolius is dominant, growing as a small tree that ranges in height from 1.8-3.7 meters (6-12 feet), depending in part on site quality and intensity of past browsing. *Cercocarpus ledifolius* cover also ranges widely (10-30% plus). Numerous other shrubs are present, including *Artemisia tridentata ssp. vaseyana, Artemisia arbuscula, Ericameria nauseosa (Chrysothamnus nauseosus), Chrysothamnus viscidiflorus,* and *Eriogonum species,* though their combined canopy cover does not exceed 5-10%. The herbaceous layer usually occurs on sparse soil, gravelly with cobbles. On dry slopes with southerly exposures, cool-season grasses such as *Pseudoroegneria spicata, Achnatherum hymenoides (Oryzopsis hymenoides), Hesperostipa comata (Stipa comata),* and *Poa secunda (Poa sandbergii),* occur with higher canopy cover with Mountain mahogany. Festuca idahoensis becomes the dominant understory grass on more favorable soils on north exposures.

3.1.4 Artemisia arbuscula ssp. Arbuscula/Festuca idahoensis (Shrub Grassland Little Sagebrush/Idaho Fescue Shrub Grassland)

This dwarf sagebrush shrub herbaceous association occurs from an elevation of 1,525 to 2,775 meters (6,200-9,000 feet) (Photos 3, 6 and 7 in Appendix B). It occurs on dry, exposed moderate slopes, undulating to rolling topography, lower mountain toe-slopes, inaccessible ridges, and very steep canyon talus slopes. Soils are shallow or moderately deep, from well- to moderately well-developed. *Artemisia arbuscula* is the characteristic and predominant low shrub, although it co-occurs with *Artemesia tridentate* var. *vaseyana* and *Artemisia nova* on the upper slopes near the open pit mine. Cover of the low shrub is scattered and open (8-30%). *Festuca idahoensis* is the dominant understory grass (3-36% cover), with *Pseudoroegneria spicata* usually present; however, it can often be absent (0-25%), *Poa secunda (Poa sandbergii), Achnatherum thurberianum (Stipa thurberiana*). Common forbs include *Senecio integerrimus, Balsamorhiza saggitata,* and *Eriogonum spp*.

3.2 Vegetation Community Mapping

CES performed the floristic surveys within the Project Area from June 8-13, and June 19-23, 2017, when most forbaceous species were blooming. This time of year is an optimum time for field identification, both for the rare plant surveys and for the ecological vegetation community mapping. The Project Area includes a combination of native vegetation and disturbances from many years of mining since the early 1900s in the form of two-track roads, improved roads, buildings, tramways, open pits, mining overburden hills, conveyors for transporting mined material, a washing station, a processing plant, and buildings.

3.2.1 Methods

During the floristic surveys for rare plants, notes were made demarking the boundaries between vegetation communities. Effort was also spent, while standing at optimal vista points, to draw polygons encompassing discrete boundaries between vegetation communities within the Project Area. The vegetation within the Project Area was categorized into 12 primary vegetation communities first generally described by the Southwest Regional Gap Analysis Project mapped land cover maps (USGS, 2007) and modified and refined into the USGS GAP Land Cover Maps (2017) system now used by federal agencies.

The USGS GAP Land Cover Map for the area encompassing the Empire Mine was used as a base map for the mapping of vegetation communities. As the land cover designations varied somewhat from what was actually on the ground**,** changes in the cover types are noted in the revised vegetation cover map (Figure 5).

The GAP Land Cover Map was chosen because this is the standard now for federal agencies tasked with natural resource oversite. GAP provides data and tools for science-based analysis of biological diversity. The widely recognized “gap analysis” methodology helps evaluate land-use effects on species and habitats to ensure that common species do not become endangered or threatened. GAP publishes two critical U.S. datasets, one of which is protected areas (PAD-US)—ownership boundaries of federal, State, and local parks and refuges, which is widely used for planning future conservation and recreation investments, and assessing climate impacts and mitigation strategies. It also provides land cover—the most detailed and consistent data on natural vegetation communities and urban land uses developed nationally. Widely used for biodiversity assessments, State Wildlife Action Plans, climate adaptation plans, and other applications use GAP maps.

The existing vegetation community survey included walking and driving through the Project Area, mapping the existing vegetation communities, noting species associations and community characteristics, and recording individual plant species. The defining boundaries of each vegetation community were recorded by drawing the relationship of the boundary to the nearest natural or noticeable landmark (ridgeline, summit, rock outcrop, fence, pole, etc.) on an aerial photo, recording waypoints with a Garmin hand-held GPS receiver, and recording placemarks on the Avenza mapping app on a cell phone as a back-up resource. Accompanying photos of noteworthy biological entities were attached to the placemarks in Avenza. A floristic inventory was performed and a list of individual plant species, including the vegetation community in which the species was found, was compiled.

Once these tasks were accomplished, the dominant conifer and shrub species that were documented during the vegetation community survey were listed as broad-scale community types. These two main forest types and two woodland-shrub types were researched using NatureServe's descriptions of these ecological community types, and how they correspond geographically to this area. The USGS GAP map was used as a base map for the vegetation community types map representing those types that exist on the Project Area. First, large polygons were drawn onto the GAP map. It was quickly apparent that one of the tree types, Mountain mahogany (*Cercocarpus ledifolius*), was misrepresented almost completely on the GAP map. Almost all of the areas marked with this vegetation type are actually disturbed mining areas where little or no vegetation exists.

Although many of the other classifications used in the Legend for the GAP digital land cover maps were fairly accurate, the Intermountain Basins Curl-Leaf Mountain Mahogany (CELE) Woodland and Shrubland cover required extensive revision. Most of these sites, once investigated, proved to be disturbed sites with overburden hills covering the area rather than CELE. The Harvested Forest land cover designations also varied somewhat or completely from what is actually current vegetation ground cover present. This is likely due to the aerial imagery being interpreted by desktop researchers who mistook many of the disturbed sites for regenerative vegetation cover types. Due to the inaccuracy of many of the vegetation community designations in the GAP map of the Project Area, a revised vegetation cover map was created that more accurately reflects what is on the ground at this time (June 2017). This revised map is found in Figure 5.

Because it is a tree/woodland type, and longer lasting on the landscape than either shrub or forbaceous (wildflower) components of the vegetation communities, the Mountain mahogany (*Cercocarpus ledifolius*) dominated community type was maintained throughout the mapping process, although in the final map, it is much reduced in size and areas from what is represented on the original base GAP map.

3.2.2 Results of Vegetation Community Mapping

The specific vegetation community cover types within the Project Area are described below and include plant association descriptions developed from multiple CES field observations from many aspects of the Project Area. These are represented by polygons of ecological community descriptions, resembling those first developed by both NatureServe and the USGS GAP programs that were subsequently altered and modified to correctly correspond to the vegetation species associations currently covering the Project Area as viewed in the field by CES (Figure 5). The final cover designations are modified from the base USGS GAP Land Cover Map color codes which were used for mapping plant communities during the June 2017 field surveys. These designations have been modified to more closely match the species associations and vegetation cover that exists within Project Area boundaries. Trees and shrubs, which exist longer and thus define a plant community longer, are listed as the first or main vegetation community component. The second species of shrub, forb, or grass components most commonly and closely associated with the dominant species is listed second. A complete list of plant species compiled during the floristic inventory and the vegetation communities they occur in is included in Table 2.

This vegetation community cover map was created after multiple site visits and gaining access to vista points enabling CES to view large sections of the Project Area. Polygons were drawn around the plant community boundaries on the base GAP Land Cover Map, altering the base map to where it better reflected plant cover that is currently covering the ground. In some areas, due to repeated mining disturbance, little vegetation cover exists, and these areas were designated as "disturbed."

3.2.3 Pseudotsuga menziesii/Symphoricarpos oreophilus (Douglas-fir/Mountain Snowberry) Forest

This most common forest association, as detailed above and corresponding to the Middle Rocky Mountain Montane Douglas-fir Forest and Woodland USGS GAP Cover, occurs on foothills and steep mountain slopes within the Project Area (Photos 4 and 5 in Appendix B). Elevations range from 6,300 – 8,500 feet, mostly as an upland community, although there are Douglas fir that encroach into the narrow riparian zone of Horseshoe Canyon. Douglas-fir was observed occurring on steep north-facing slopes in narrow canyons on the mine property where dense shade and steepness preclude any significant shrub or herbaceous understory. It occurs on the northern aspects with moderate to very steep mid and upper slopes and ridges. Soils are variable and appear to range from deep silt loam to shallow, rocky substrates.

3.2.4 Populus tremuloides - Pseudotsuga menziesii/Symphoricarpos oreophilus (Quaking Aspen-Douglas Fir/Mountain Snowberry) Forest

This forest association, detailed above and corresponding to Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland USGS GAP Cover, occurs only in a small section of the Project Area. It forms a minor component of the forested vegetation communities on the Empire Mine land. This is probably due to the dryness of this area, as aspen needs abundant moisture to maintain itself on the landscape. Most stands occur at an elevation between 1,800 and 2,300 meters (6000-7500 feet) on gentle to steep slopes, on all aspects, primarily on soils derived from sedimentary parent materials. The tree layer is a mixture of *Populus tremuloides* and *Pseudotsuga menziesii*.

3.2.5 Cercocarpus ledifolius / Festuca idahoensis (Curl-leaf Mountain-mahogany/Idaho Fescue) Woodland

This community type, which corresponds to the Inter-Mountain Curl-leaf Mountain Mahogany Woodland and Shrubland USGS GAP Cover type as detailed above, occurs on moderate to steep, rocky and north-facing slopes of varying parent materials; elevations range upward from 6,300 feet to at least 9,000 feet within the Project Area. It occurs on comparable settings in the Challis Volcanics and Idaho Batholith sections of central Idaho. This association occurs on steep south-facing slopes on hillsides where the north-facing slope is covered in Douglas fir. It occurs on steep slopes composed of limestone sedimentary colluvium, which weathers to shallow, poorly developed and excessively drained soils. It is frequently mislabeled on the USGS GAP Vegetation Cover Map, as many places labeled with this designation are actually disturbed sites where mining activities have taken place with little vegetation cover currently present.

3.2.6 Disturbed and Invasive Annual and Biennial Forbland

Disturbed and invasive annual biennial forbland occurs in areas mostly devoid of vegetation where past mining-related activities occurred or where dirt roads exist within the Project Area. This

vegetation community encompasses approximately 30 acres within the Project Area. Shrubs within the disturbed area include rubber rabbitbrush (*Ericameria nauseosa*).

This is a small area within the project boundary associated with a cattle trough, where native species have been trampled or eaten out and replaced with invasive annual and biennial forbs. Compacted and trampled soils have created an opening for these exotic, non-native plants to invade the surrounding low sagebrush meadow.

Detrimental range seedings, predominantly consisting of cheatgrass (*Bromus tectorum*), Russian thistle (*Salsola tragus*), and tansy mustard (*Descurainia species*), have invaded the former native forbs and grasses.

The Invasive Annual and Biennial Forbland vegetation community is dominated by cheatgrass; however, a substantial amount of Sandberg bluegrass (*Poa secunda*) is interspersed with cheatgrass. Shrubs within this vegetation community are sparsely scattered and include rubber rabbitbrush and low sagebrush (*Artemisia arbuscula*). Grasses documented within this vegetation community include desert wheatgrass (*Agropyron desertorum*), smooth brome (*Bromus inermis*), cheatgrass (*Bromus tectorum*), orchard grass (*Dactylis glomeratus*), bottlebrush squirreltail (*Elymus elymoides*), and intermediate wheatgrass (*Thinopyrum intermedium*). Forbs found within this community include, but are not limited to, pale madwort (*Alyssum alyssoides),* whitetop (*Cardaria pubescens*), tansy mustard (*Descurainia sophia*), filaree (*Erodium cicutarium*), saltlover (*Halogeton glomeratus*), and prickly lettuce (*Lactuca serriola*), clasping pepperweed (*Lepidium perfoliatum*), Russian thistle (*Salsola tragus*), and tumble mustard (*Sisymbrium altissimum*).

3.2.7 Recently Mined or Quarried

The Recently Mined or Quarried vegetation community is an altered or disturbed land cover type comprised mainly of the historic Empire Mine Open Pit. The open pit is visible on imagery and in the field as an area that lacks vegetation.

3.2.8 Abies lasiocarpa - Picea engelmannii/Juniperus communis (Subalpine Fir - Engelmann Spruce/Common Juniper) Woodland

This spruce-fir woodland association corresponds to the Northern Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland USGS Gap Cover type. This woodland association occurs in localized areas within the farthest southern reaches of the subalpine to upper montane zones of the Project Area, near the open pit area of the Empire Mine. The primary elevation range for the association is between 2,530 and 3,200 meters (8,300-11,500 feet). It occurs on gentle to somewhat steep mid to upper slopes of all aspects and on benches or at lower elevations on dry stream terraces with cold-air drainage. Soils are variable but generally rocky and well-drained with substantial areas of lichen-covered bedrock or bare soil. This association is among the driest types of *Abies lasiocarpa* forests and woodlands. The canopy is relatively open and dominated by *Abies lasiocarpa* with *Picea engelmannii* often codominant. Seral species in the tree canopy can include *Pinus flexilis, Pinus albicaulis* with *Pseudotsuga menziesii* occurring on relatively warmer sites, and *Juniperus communis* also occurring on warmer, drier sites.

The shrub layer is often sparse but characterized by large, widely spaced patches of *Juniperus communis*. Additional shrub species occur and can include *Shepherdia canadensis, Vaccinium scoparium, Ribes montigenum, Symphoricarpos oreophilus,* and, occasionally, *Mahonia repens and Antennaria spp.* The herbaceous layer is likewise sparse. Species occurring most frequently include *Arnica cordifolia, Lupinus argenteus,* and *Fragaria virginiana.*

3.2.9 Pinus flexilis/Purshia tridentata (Limber Pine/Antelope Bitterbrush) Woodland

This woodland association corresponds to the Rocky Mountain Subalpine-Montane Limber Pine Woodland USGS GAP Cover, although no Bristlecone Pines are present in the Project Area. This woodland association occurs in small, isolated stands located on volcanic, unweathered soils. The plant association occurs in a semi-arid climatic region, mostly known for relatively recent mafic volcanic flow substrates. The area has an average annual precipitation of 17 inches, with a peak in winter, as most precipitation occurs as snow. Temperatures are typically hot in the summer and cold in the winter. Soil and snow collect in fissures and depressions. These sites also may reduce exposure to desiccating winds and solar radiation. This association consists of an open canopy of the needle-leaved, evergreen tree *Pinus flexilis.* These trees are of a lower stature than usual, reaching only 5 meters in height. A shrub layer is present, dominated by *Purshia tridentata,* also growing in a shorter form than found in more favorable locations. Several other shrubs are associated, including *Ericameria nauseosa* (*Chrysothamnus nauseosus*), *Ribes cereum*, *Leptodactylon pungens,* and *Artemisia tridentata* ssp. *vaseyana*. Total shrub cover is moderate. The herbaceous layer is diverse, but not abundant. The most important graminoids include the perennial bunchgrasses *Elymus elymoides, Poa secunda,* and *Achnatherum thurberianum* (*Stipa thurberiana*). The most common forbs include the suffrutescent (woody base) perennials *Eriogonum umbellatum* and *Eriogonum ovalifolium.*

3.2.10 Inter-Mountain Basins Juniper Savanna

The Inter-Mountain Basins Juniper Savanna vegetation community is only on the outskirts of the Empire Mine area, along the roadside as it travels past the Cossack Tunnel and leaves the Project Area. This vegetation community is found on more xeric sites on lower mountain slopes, plateaus, ridges, upper slopes, and side slopes, mainly within the west-central portion of the Project Area. The vegetation composition is an open savanna dominated by Utah juniper (*Juniperus osteosperma*), with high cover of perennial bunchgrasses and forbs. This vegetation community is encroaching into the Inter-Mountain Basins Big Sagebrush Shrubland vegetation community. Shrubs within this community include Wyoming big sagebrush, yellow rabbitbrush, and prickly phlox (*Leptodactylon pungens*). Grasses recorded in this vegetation community include, but are not limited to, cheatgrass, Sandberg bluegrass, Idaho fescue (*Festuca idahoensis*), and rock melicgrass. Forbs observed in this vegetation community include arrowleaf balsamroot (*Balsamorhiza sagittata*), Douglas dustymaiden (*Chaenactis douglasii*), and death camas (*Zigadenus paniculatus*).

3.2.11 Horseshoe Canyon Riparian Woodland and Shrubland

The riparian/riverine wetland vegetation community encompasses approximately 1.5 acres within the extreme southwest corner of Project Area (Figure 6). This vegetation community occurs in association with Horseshoe Canyon surface water in a narrow swath within uplands on either side of the existing stream. Trees and shrubs that occur in the vegetation community include lanceleaf

cottonwood, big sagebrush, golden currant, coyote willow, Wood's rose (*Rosa woodsii*), blue elderberry (*Sambucus nigra* var. *cerulea*). Grasses and grass-like plants detected within this vegetation community include Arctic rush, redtop, smooth brome and foxtail barley. Forbs observed within this vegetation community include varileaf cinquefoil, Canada thistle, spearmint, dandelion (*Taraxacum officinale*), stinging nettle (*Urtica dioica* var. *occidentalis*), and sweet clover.

3.2.12 Harvested Forest – Northwestern Conifer Regeneration

This is a USGS Vegetation Cover designation that was limited to small portions of the Project Area. These are areas where clear-cuts occurred in the past and there are second and third growth stands of Douglas-fir returning as a vegetation cover type.

3.2.13 Harvested Forest – Shrub Regeneration

This is a USGS Vegetation Cover designation that was limited to small sections of the Project Area. These areas appear to be Douglas-fir clear-cuts that occurred in the past, but the former stands of conifers are being replaced by snowberry and low sagebrush (Photos 8 and 9 in Appendix B).

3.3 Special Status Plant Survey

CES reviewed lists maintained by the Idaho National Heritage Program, which included special status species data for larger geographical areas surrounding the Project Area (INHP, 2017). USGS topographic maps, 2012 color aerial photography, NRCS soil survey reports, and geographic information system (GIS) land cover files (USGS, 2017) were used to determine the vegetation communities and identify potential habitat for special status plant species that could occur within the Project Area. Any species identified during the background research with potential habitat in the Project Area, or which have been documented to occur within three miles of the Project Area, were considered target species if they were considered to be an SOC or a special status plant species by agency vegetation or wildlife specialists.

CES utilized the 2015 Idaho BLM Sensitive Species List to determine which BLM sensitive plant species may occur in the Project Area. CES utilized the US Federal Wildlife Service (USFWS) Idaho Fish and Wildlife's website listing of floristic SOC for Custer County to determine which federally listed species may occur in the Project Area (USFWS, 2017). The USFWS identified occurrences or potential habitat within the Project Area for any special status plant species (USFWS, 2017). Appendix D includes an assessment of the potential occurrence of special status plant species in the Project Area.

The information garnered through consultation and research with various state and federal agencies was used to develop the list below of target special status plant species to survey for during the June 2017 CES field surveys.

- Pinus albicaulis (Whitebark Pine)
- Lewisia sacajaweana (Sacajawea's bitterroot)
- Draba trichocarpa (Stanley whitlow-grass)
- Eriogonum meledonum (Guardian buckwheat)

- Eriogonum crosbyae aka E. capistratum var. welshii (Crosby's buckwheat)
- Astagalus diversifolius (Mesic Milkvetch)
- Primula incalina (Bluedome primrose)

NatureServe conservation status ranks are a valuable complement to legal status designations assigned by government agencies such as the USFWS in administering the U.S. Endangered Species Act (ESA). Conservation status ranks are based on a one to five scale, ranging from critically imperiled (G1) to demonstrably secure (G5). Status is assessed and documented at three distinct geographic scales-global (G), national (N), and state/province (S). The conservation ranks of the vegetation SOC listed below are described for each species, if they carry those designations, which are also known as Special Status Species, as they are being studied and watched by federal and state agencies for changes in their populations and/or trends towards increasing or decreasing populations.

3.3.1 Descriptions of Target Special Status Plant Species

The following plant species were Special Status Species targeting during the field surveys.

Pinus albicaulis (Whitebark Pine)

Global Status: G3G4, **National Status:** N3N4

Reasons: The Whitebark Pine tree species is limited to only upper subalpine forests of many western North American mountain ranges. However, it is severely threatened in the majority of its range by introduced white pine blister rust (*Cronartium ribicola)*, outbreaks of mountain pine beetle (*Dendroctonus ponderosae*), succession resulting from decades of fire suppression, climate change resulting in decreases in suitable habitat, and various synergies between these factors. It is expected that the blister rust will eventually become abundant in the vast majority of the range causing significant tree mortality. Tree mortality rates exceeding 50% have already been documented in numerous parts of the range (Whitebark Pine Ecosystem Foundation, 2006). In addition, it has relatively low genetic variation and exists as a fragmentary species, making it more vulnerable than its range might indicate. This is a keystone species of high-elevation western ecosystems whose decline is expected to have cascading effects on ecosystem function and biodiversity.

Comments: Whitebark pine grows within montane forests and on thin, rocky, cold soils at or near timberline from 1,300-3,700 meters in elevation (Flora of North America, 1993). In moist mountain ranges, Whitebark Pine is most abundant on warm, dry exposures, but in semiarid ranges, it becomes prevalent on cool exposures and moist sites (Burns and Honkala, 1990). Although its role in the plant community is changing, Whitebark Pine historically dominated many of the upper subalpine plant communities of the western United States and was a major component of subalpine forests in the northern Rocky Mountains.

Lewisia sacajaweana (Sacajawea's Bitterroot)

Global Status: G2 – Imperiled, **National Status:** N2

Reasons: This species is endemic to the mountains of central Idaho within 6-7 counties and approximately 30 occurrences. Populations of *Lewisia sacajaweana* were previously thought to be *Lewisia kelloggii* (Kellogg's lewisia) but described as a distinct species in 2005.

Taxonomic Comments: According to Wilson et al. (2005), *Lewisia sacajaweana* is a taxon related to *Lewisia kelloggii* but with consistent morphological difference to justify species status. Plants in Idaho, previously considered *L. kelloggii*, are now treated as *L. sacajaweana*, endemic to Idaho. *L. kelloggii* is considered only present in California.

Overall Threat Impact Comments: Most sites have few threats or minimal threats: impacts from trails (horse and foot tracks), unauthorized all-terrain vehicle use, roads (turn-around at site or maintenance/construction), trampling by sheep at one site, potential wildfires, and a few sites could have mining and logging in the future.

Draba trichocarpa (Stanley Creek Whitlow-Grass)

Global Status: G2 – Imperiled, **National Status:** N2

Reasons: Stanley whitlow-grass (*Draba trichocarpa*) is a narrow endemic known from 12 small occurrences near Stanley, in the Sawtooth Valley in central Idaho. Although it is very local, no largescale, imminent, anthropogenic threats to its long-term conservation have been identified.

Eriogonum meledonum (Guardian Buckwheat)

Global Status: G2 – Imperiled, **National Status:** N2

Reasons: Guardian buckwheat is narrowly endemic in the Sawtooth Valley in central Idaho. The eight known occurrences support approximately 4,500 individuals on approximately 11 hectares. Most occurrences are relatively secure. This taxon is not considered distinct by the most current floristic works but research into the complex might be necessary.

Comments: Ground disturbance associated with elk trampling has been documented at all eight occurrences (Mancuso, 2001). Levels of this disturbance do not appear to threaten guardian buckwheat at most occurrences. Trampling is heaviest at the Stanley #4 occurrence, but it is unclear if it has an adverse effect on guardian buckwheat. Cattle trampling at the small Stanley Creek occurrence was identified as a possible threat in the past. In 2001, the Forest Service constructed a drift fence to direct cattle away from the occurrence. Motorcycle disturbance was also identified as a threat to the Stanley Creek occurrence in the past (Moseley, 1988). Although relatively minor, impacts to guardian buckwheat and its habitat from motorcycle/off-road vehicle (ORV) use was documented for at least two other occurrences during field visits in 2000 (Mancuso, 2001). Motorcycle/ORV use is restricted to roads within the Sawtooth National Recreation Area (NRA); however, users do not always adhere to the restriction. If not controlled, ORV use has the potential to be a much larger problem for guardian buckwheat and its associated habitat, as several weed species have become established in the Sawtooth Valley in recent years.

Eriogonum crosbyae aka E. capistratum var. welshii (Crosby's Buckwheat)

Eriogonum capistratum Reveal; *E. capistratum* var. *muhlickii* Reveal; *E. capistratum* var. *welshii* Reveal; *E. meledonum* Reveal; *E. ochrocephalum* S. Watson var. *alexanderae* Reveal; *E. verrucosum* Reveal

Rounded Global Status: G4 - Apparently Secure, **National Status:** NNR

Comments: Flowering May-Aug. White tuffaceous shale volcanic outcrops, metamorphic rock outcrops, or basaltic or granitic sandy flats, washes, slopes, and ridges, saltbush and sagebrush or high-elevation sagebrush to alpine tundra communities, juniper or montane conifer woodlands in Idaho, Montana, Nevada, and Oregon. *Eriogonum crosbyae*, as now defined by the Flora of North America (1993), is widely scattered in the valley bottoms and foothills, and atop several mountain ranges in central Idaho (Blaine, Butte, Camas, Custer, and Lemhi counties).

The species may be subdivided into four phases for which names are available. The vast majority of populations have bright yellow flowers with pustulose bases and midveins. The pustulose condition may also be observed in *Eriogonum chrysops* (on pale greenish-yellow flowers) and in *E. mancum* (with cream-colored flowers). Populations with pale yellow flowers here assigned to *E. crosbyae* occur in the mountains near Mackay, Idaho, and cream-colored flowers are found near Challis and around Salmon – both well outside the known ranges of *E. chrysops* and *E. mancum*. Final resolution of the taxonomy of this group awaits further study. (FNA, Vol. 5)

As defined by the Idaho Natural Heritage Program, *Eriogonum capistratum* var. *welshii* (aka E. crosbyae, as now defined), or Welsh's buckwheat, carries the designation of G4T2Q, S2, as a BLM Sensitive Type 3 species.

Astagalus diversifolius (Mesic Milkvetch)

Rounded Global Status: G2 – Imperiled, **National Status:** N2

Reasons: Apparently quite rare. Currently known only from southeastern Idaho (valleys of the Lost and Lemhi Rivers and upper Snake River Plains), the western edge of the Great Salt Lake Desert in Utah, and Spring Valley in White Pine County, Nevada, and six occurrences in the Great Divide Basin, Wyoming (Barneby, 1964; Cronquist, 1989). Threatened by habitat loss to agriculture and livestock grazing.

According to Handley and Fertig (2001), it is threatened in Wyoming by alteration of the natural hydrology, typically in activities that draw water away for other uses. The most common water altering activity is stock pond management, which negatively impacts the habitat suitability upstream and downstream of the inundation zone. Ditching and draining also have caused hydrology changes. These threats, as well as oil, gas, and uranium drilling, are all reported by Heidel (2015). Lastly, noxious weeds that are salt-tolerant are a threat to this species.

Short-term Trend: Decline of 10-30%

Short-term Trend Comments: The Idaho Conservation Status Rank has increased from S2 (imperiled) to S1 (critically imperiled).

Primula incalina (Bluedome Primrose)

Rounded Global Status: G2 – Imperiled, **National Status:** N2

Reasons: Known from east-central Idaho and southwestern Montana. Was thought to be extirpated from Montana until 2002. There are about 16 extant occurrences across the two states. Portions of its wet meadow habitat have been degraded at several sites by past management activities, but all extant populations appear to be stable. Threats could include alteration to hydrology and livestock grazing.

Comments: Wet, alkaline meadows at the headwaters of spring-fed creeks in the large, intermontane valleys. The plants are found on low, relatively level benches adjacent to creeks and spring heads, often on the insides of meander loops, and also on low benches with hummocky topography, but only on the sides and tops of the hummocks. Elevations range from approximately 1920-2040 m. Bluedome primrose (*Primula alcalina)* occurs in wet, alkaline meadows, at the headwaters of spring-fed creeks in the large, intermontane valleys of east-central Idaho. Soils in the meadows are alluvial, alkaline, fine-textured, light-colored, and derived from outwash from the predominantly carbonate rocks of the Beaverhead, Lemhi, and Lost River ranges.

The vegetation species identified during the background research with potential habitat in the Project Area were considered target species if they were identified as being an SOC or a special status plant species by state or federal vegetation specialists. While there are no federally listed plant species known to occur in Custer County, Whitebark Pine (*Pinus albicaulis*) is a Candidate species currently being considered for future listing (USFWS, 2017) due to its rapid decline from its former range and population sizes.

3.3.2 Survey Results for Special Status Plant Species

CES performed a survey for special status plant species within the Project Area from June 8-11 and June 19-23, 2017. The survey was conducted during the appropriate time of year when special status plant species would be most visible and identifiable. The list of special status vegetation species targeted during the June 2017 field surveys is included in Table 3.

Rare and endemic plant surveys were conducted using the following techniques:

- Cursory. A cursory or general survey typically consists of walking through the area and around the perimeter. This survey type is usually used to identify potential habitat or confirm prior information.
- Intuitive. An intuitive-controlled survey is the most commonly used and efficient method of surveying. During pre-field review, potential suitable habitat is identified for each species of interest and the survey effort is focused in those areas. When conducting intuitive-controlled surveys, an area somewhat larger than the identified suitable habitat is searched to validate current suitable habitat definitions.

- Systematic. A systematic survey is often used in smaller areas where the likelihood of occurrence of a target species is evenly distributed throughout the Project Areas. All of the area is examined, generally by using transects.

CES visited areas where potential habitat for target species possibly occur within the Project Area based on the pre-field review of maps, aerial photographs, and other data. No observations of special status species and/or habitat were recorded other than Whitebark Pine (*Pinus albicaulis*), which occurs at the highest elevations within the Project Area (Figure 7; Photo 10 in Appendix B).

One USFWS Candidate SOC and BLM and US Forest Service sensitive plant species was identified during the CES special status species surveys – *Pinus albicaulis* or Whitebark Pine. This increasingly rare tree species occurs only in the very highest elevations within the Project Area, above elevations where Konnex is planning to explore and possibly expand operations (Figure 7). This population consists of about 12 individual trees associated with *Abies lasiocarpa* (sub-alpine fir) with little understory on shallow, scant skeletal soils on a very steep grade (70-80 percent slope).Location data of this small group of individual Whitebark Pine was recorded using GPS receivers. The NatureServe habitat description for Whitebark Pine matches the habitat and environment that occurs on the extreme southern edge of the Project Area boundary where the Whitebark Pines exist. Potential habitat was observed in this and other areas of high elevation, but usually Limber Pine (*Pinus flexilis*) was the dominant pine. Other areas nearby were investigated for other populations, but only scattered individual Whitebark Pines were located, usually associated with *Pinus flexilis* (Limber Pine): a closely related five-needled pine that grows at mid to high elevations on the Project Area and is more commonly found within project boundaries (Figure 7).

Although no other sensitive plant species were located within the Project Area, close congeners were located and documented of *Astragalus diversifolius* and *Eriogonum crosbyae:* two SOC that have potential to occur within Project Area boundaries. *Astragalus purshii* var. *concinnus* (wooly pod milkvetch) was located on a shallow gravelly soiled bench near the open pit mine (GPS #34, Coordinates: 43.878019, 13.691808). *Astragalus diversifolius* (meadow milkvetch) was not located, and the closest location it is known to occur is about 20 miles to the northwest of Empire Mine. *Eriogonum caespitosum* var. *sphaerocephalum* (matted buckwheat), another buckwheat species similar to *Eriogonum capistratum*, was located in the same area as wooly pod milkvetch.

Crosby's buckwheat was not located within the Project Area; however, a closely related species of buckwheat, *Eriogonum caespitosum* var. *sphaerocephalum* (matted buckwheat), was located at GPS 34 in the same area as wooly pod milkvetch.

3.4 Survey of Noxious Weeds and Invasive, Non-native Species

CES performed a survey for noxious weeds and invasive, non-native species (Table 4). A survey of moderate intensity was employed across the entire Project Area and intensified in areas that appeared to have a high potential for noxious weed infestations, such as previously disturbed areas and exposed soils. Any occurrences of noxious weeds were recorded with a GPS receiver.

Noxious weeds in Idaho are designated by the following criteria:

- It must be present in but not native to Idaho.
- It must be potentially more harmful than beneficial to Idaho.
- Eradication must be economically and physically feasible.
- The potential adverse impact of the weed must exceed the cost of control.

Only four of the listed Idaho noxious weeds were located within the Empire Mine Project Area during the June 2017 surveys. The area was remarkably weed-free, especially considering how often repeated disturbance has taken place within Project Area. Cheatgrass (*Bromus tectorum*) was present along the roadways, but did not occur as frequently as it does on many other roads in Idaho. No knapweeds were viewed. The most common weedy species, Canada thistle (*Cirsium arvense*), was confined to areas associated with the Horseshoe Canyon drainage.

4.0 WETLAND DELINEATION

Wetland delineations were performed after a preliminary data review and field surveys to delineate wetland and waterbody boundaries. The preliminary data review used available resources such as USGS topographic maps, NRCS soil surveys, National Wetlands Inventory (NWI) mapping, and aerial photography. The field survey identified only one wetland and waterbody boundary within the Project Area in Henderson Canyon. An important part of the wetland delineation is to provide a determination on the connectivity of the Henderson Canyon features to jurisdictional features as a proxy for jurisdictional status of the wetlands and waterbodies. However, the ultimate decision on jurisdictional boundaries rests with the US Army Corps of Engineers (USACE) as the regulatory authority.

Wetland delineations were based on the criteria and methods outlined in the Regional Supplement to the USACE Wetland Delineation Manual (Environmental Laboratory, 1987) and the USACE Wetlands Delineation Manual, Technical Report Y-87-1, (Environmental Laboratory, 1987) and the Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Environmental Laboratory, 2006) and the Arid West Region Version 2.0 (2008b), and subsequent guidance documents (USACE, 1991a, 1991b, and 1992). On-site wetland determinations were made using the three criteria – vegetation, soil, and hydrology – and the technical approach defined in the Arid West Regional Supplement. According to procedures described in the Arid West Regional Supplement (USACE, 2008b), areas that under normal circumstances reflect a predominance of hydrophytic vegetation, hydric soils, and wetland hydrology (e.g., inundated or saturated soils) are considered wetlands. In areas where one or more wetland parameters may have been absent or misleading, the area was mapped using mainly soil characteristics, depressional landscape position, remnant hydrophytic vegetation, and/or persistent hydrological indicators, as specified by the manual.

4.1 Wetland Delineation Procedure

The wetland delineation was conducted on June 21 and 22, 2017, in the Horseshoe Canyon portion of the Project Area using the three-parameter approach. The delineator walks the waterway corridor, which is generally defined as a specific distance on both sides of the waterway, for the length of waterway included in the project. The delineator establishes sample points along a preliminary

wetland boundary to examine and record existing soil, vegetation, and hydrological conditions. These sample points are established in pairs along the preliminary wetland boundary with one point representing the wetland and one point representing the upland. Final wetland boundaries are then determined based on observations at sample point locations. The delineator will use a sub-meter accurate GPS to record the location of sample points and the location of final wetland boundaries within the wetland corridor. As well as the Arid West forms, a map was drawn of each of the sample point sites along the waterway where surface water was flowing.

Once the data are collected, the delineator usually submits a report to the USACE for formal jurisdictional determination. The jurisdictional determination indicates which portions of delineated wetlands the USACE has the authority to regulate fill under the Clean Water Act (ACOE, 1987 and 2008). Since there is no apparent connectivity between the seasonal flow in Horseshoe Canyon to the Big Lost River near Mackay, no formal report was submitted to the USACE.

4.2 Indicator Status

For a site to be classified as having hydrophytic vegetation for wetland delineation purposes, the indicator status assignments are based entirely on the National List of Plant Species that Occur in Wetlands (Reed, 1988 and 2008). The probabilities of whether a plant species occurs on a wetland are defined as follows:

- Obligate Wetland (OBL): A species that almost always occurs under natural conditions in wetlands (estimated probability greater than 99%).
- Facultative Wetland (FACW): A species that usually occurs in wetlands (estimated probability 67%-99%) but is occasionally found in non-wetlands.
- Facultative (FAC): A species that is equally likely to occur both in wetlands or non-wetlands (estimated probability 67%-99%).
- Facultative Upland (FACU): A species that usually occurs in non-wetlands (estimated probability 67%-99%), but is occasional found in wetlands (estimated probability 1%-33%).
- Obligate Upland (UPL): A species that occurs in wetlands in another region (estimated probability greater than 99%), but almost always occurs under natural conditions in non-wetlands in the region specified (Region 8 for this report). If a species does not occur in wetlands in any region, it is not on the national list.
- Not Found on List (NOL): A species for which nothing has been reported.
- No Indicator (NI): A species for which there is insufficient data to provide an indicator determination.

For a site to be classified as having hydrophytic vegetation, dominant plant species must have certain characteristics. On the data forms in Appendix E, CES recorded the dominant plant species that occurred within a 5-foot radius of each sample point. The relative occurrence of dominant species was estimated visually. Species comprising 20 percent or more of the total areal cover per stratum were considered dominant, following the guidelines of the USACE 50/20

rule (Environmental Laboratory, 1987). The wetland indicator status of dominant plants was noted. Plant species recorded were assigned an indicator status according to the National List of Plant Species that Occur in Wetlands: Intermountain Region (USFWS, 1988).

In this case, the indicator status is associated with certain environmental conditions whose presence indicates the existence of wetlands. Of the dominant plant species recorded, greater than 50% must have had an indicator status of facultative (34-66% probability of occurring in wetlands), facultative wetland (67-99% probability of occurring in wetlands), or obligate wetland (greater than 99% probability of occurring in wetlands) for a site to be classified as having hydrophytic vegetation for wetland delineation purposes.

For each sample point, the presence or absence of hydrological indicators was noted. The determination of wetland hydrology was based on the presence of at least one positive primary indicator or two positive secondary indicators of a prolonged period of saturation. Primary indicators include observation of soil inundation or saturation, watermarks, debris drift-lines, sediment deposits, and drainage patterns in wetlands. Secondary indicators include oxidized root channels in the upper 12 inches of soil, water-stained leaves, soil survey data, and the facultative-neutral test. Environmental changes and the topographic position of the sample points relative to observed water tables were also noted.

When possible, soil pits were dug at each sample point to a depth of at least 16 inches to characterize soil profiles and soil/water conditions. At least one positive hydric soil indicator was required at each site to classify a soil as hydric. For example, soils in prolonged anaerobic conditions undergo chemical reduction, thereby, producing lighter soil colors. During the field survey, the colors of the soil profile matrix and mottles were identified using Munsell® soil color charts (Kollmorgen Instruments, 1990). Soil horizonation, texture, moisture content, and depth to saturation and/or standing water were noted. The presence or absence of particulate organic matter, organic matter staining, concretions, mottling, and gleying also were noted.

Wetland boundaries were identified in accordance with the USACE Wetlands Delineation Manual (Environmental Laboratory, 1987) and the Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Environmental Laboratory, 2006). The Arid West supplement datasheet, first used in 2007 after the USACE issued the supplement, was the form used for this 2017 wetland delineation. These forms created for each of the four sample sites are listed in Appendix E, along with maps of the areas drawn with the vegetation species designated with their symbols (first two letters of genus and species' scientific names). Wetland vegetation species associated with this wetland are listed in Table 5.
The three-parameter approach (hydrology, soils, and vegetation) was used to make wetland boundary determinations. In areas where one or more wetland parameters may have been absent or misleading, the area was inspected using primarily soil characteristics, depressional landscape position, remnant hydrophytic vegetation, and/or persistent hydrological indicators, as specified by the manuals.

Sample points were established in marginal wetlands or uplands where data are gathered to determine the vegetation community's jurisdiction. Sample points were also established at

existing wetlands throughout the portion of Horseshoe Canyon where surface water was present to characterize existing hydrological, soil, and vegetative conditions. Due to the narrow nature of the riverine wetland present, the upland boundary with the wetland vegetation associated with the surface water present was very close to the stream and was easily recognizable as the vegetation species shifted rapidly within a few feet away from the stream edges, helping define the wetland/upland boundary. One upland sample pit and one wetland sample pit were dug at Sample Site (SS) #1 to test this observation for each wetland area. Complete 18-inch-deep sample pits were not dug in areas determined to be upland.

The riparian/wetland areas within the Horseshoe Canyon drainage study area were classified into two classes and habitat types following the guidelines established by the USFS Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al. 1979):

- Palustrine Forested (PFO)
  - Subclass: shrub-trees and trees
  - Series: willows, cottonwoods, red-osier dogwood
  - Dominant species: *Salix exigua, Populus acuminata, Cornus sericea*
- Riverine Unconsolidated Bottom (RUB)
  - Subclass: Herbaceous wetland species specific to riverine environment
  - Series: willowherb, varileaf cinquefoil
  - Dominant species: *Epilobium ciliatum, Potentilla diversifolia*

The PFO wetland type is characterized by woody vegetation, typically taller than six feet. The forested vegetation category consists of woody plants including willows and cottonwoods, which occur in a narrow (4-20 feet) flowing open water riverine drainage. This wetland type is confined to a large cottonwood and Geyer's willows growing right at the intersection of the roadway and Horseshoe Canyon to up above SS #2, where an overburden hill constricts the channel (Appendix E).

In a RUB system (low energy open water in streams and rivers), water is usually flowing and 25% of the bottom is covered with particles smaller than stones with a vegetative cover of less than 30%. Small portions of the bankfull channel (less than 700 linear feet of the channel of Horseshoe Canyon Drainage are considered to match the RUB wetland type).

4.3 Wetland Delineation Results

The GPS points that were taken along the wetland delineation where flowing water exists within the Project Area boundaries are pictured in Figure 6. Sample Site #3 is near the boundary of the Project Area (Figure 6).

Although there is a running stream that begins to the south and west of the Project Area (Figure 6), only the area within the project boundary was measured and delineated. At SS #4, the wetland species begin to drop out. No willows were observed as the channel drops in lower

elevations below SS #4. The narrow riparian corridor where wetland vegetation species occur within SS #3 (the highest elevation sampled) and SS #4 begin to drop out of the wetland/riparian system and the drainage loses its wetland characteristics below SS #4. At GPS #117 (UTM coordinates 43.896258, 113.674125), surface water disappears into the ground and becomes subsurface for the remainder of the Horseshoe Canyon area that occurs within the Project Area. The wetland vegetation species that are present at SS #1-4 disappear altogether as the drainage approaches the lower elevations of the Project Area.

The investigation revealed uplands and narrow riverine wetlands within Horseshoe Canyon and within the Project Area. The upland areas occur at higher elevation areas on either side of the narrow channel of running surface water within Horseshoe Canyon. A total of 0.51 acres of wetland were found within the Project Area. It is CES' opinion that this reach of stream with surface water could not be considered jurisdictional because the Horseshoe Canyon Drainage does not constitute a hydrologic connection to the Big Lost River. The USACE has final jurisdiction over determining whether an isolated water body or wetland is subject to interstate commerce and is, therefore, a "water of the United States."

5.0 WILDLIFE SURVEYS

The work plan for wildlife resources consisted of reviewing existing data, performing general wildlife field surveys, including game animals, along the commonly used routes to and from the open pit mine where exploration and drilling work would begin, and performing species-specific field surveys for special status species.

CES visited the Project Area and conducted baseline surveys for avian species of wildlife, including special status species, on the following dates: June 9-11, 2017 (three early morning point count surveys and two nocturnal owl surveys); June 19 through June 23, 2017 (four early morning point count surveys and two owl surveys).

5.1 Agency Consultation

Prior to visiting the Project Area, CES contacted the BLM, Idaho Fish and Game, INHP, and USFWS and requested information on wildlife use of the area, including information on the occurrence of special status wildlife species. Appendix A presents agency responses to these requests. The list of wildlife species researched and surveyed for is located in Appendix F.

The status of threatened and endangered species is determined by the USFWS under the provisions of the ESA, as amended. Under the ESA, endangered species are defined as being in danger of extinction throughout all or a significant portion of their range. Threatened species are likely to become endangered in the foreseeable future. The USFWS also maintains a listing of species or subspecies (i.e., taxa) that may warrant listing as threatened or endangered, and for which USFWS has sufficient biological information to support a rule to list as threatened or endangered. These species are referred to as candidate species. Proposed species are species (taxa) for which USFWS has published a proposal to list as threatened or endangered in the Federal Register (FR).

The following designations are used by Idaho Fish and Game, the USFWS and the Salmon-Challis National Forest to indicate sensitivity of species:

Idaho

- S1 – Critically Imperiled: At high risk because of extreme rarity (often five or fewer occurrences), rapidly declining numbers, or other factors that make it particularly vulnerable to range-wide extinction or extirpation.
- S2 – Imperiled: At risk because of restricted range, few populations (often 20 or fewer), rapidly declining numbers, or other factors that make it vulnerable to range-wide extinction or extirpation.
- S3 – Vulnerable: At moderate risk because of restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors that make it vulnerable to range-wide extinction or extirpation.
- S4 – Apparently secure: Uncommon but not rare; some cause for long–term concern due to declines or other factors.
- S5 – Secure: Common, widespread, and abundant.
- B – Breeding: Conservation status refers to the breeding population of the species.
- N – Nonbreeding: Conservation status refers to the non–breeding population of the species.

USFWS

- E – Endangered: Species in danger of extinction throughout all or a significant portion of its range.
- T – Threatened: Species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.
- XN – Experimental/Nonessential Population: A population (including its offspring) of a listed species designated by rule published in the FR that is wholly separate geographically from other populations of the same species.
- C – Candidate Species.

USFS

- S – Sensitive: Animal species identified by the Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.
- MIS – Management Indicator Species: Species that have been identified as a representative for other species.

In addition to federally listed, candidate, or proposed species, BLM maintains a list of sensitive Idaho species. The BLM (2015) states that native species may be listed as sensitive if the species:

- Could become endangered or extirpated from a state or within a significant portion of its range in the foreseeable future;
- Is under review (for listing as threatened or endangered) by USFWS and/or National Marine Fisheries Service;
- Is undergoing significant current or predicted downward trend in habitat capability that would reduce the species' existing distribution and/or population or density such that federally listed, proposed, candidate, or state-listed status may become necessary;
- Typically consists of small and widely dispersed populations;
- Inhabits ecological refugia, or specialized or unique habitats; and
- Is state-listed but may be better conserved through application of BLM sensitive species status.

The BLM affords these sensitive species the same level of protection as federal candidate species. The BLM's policy for sensitive species is to avoid authorizing actions that would contribute to the listing of a species as threatened or endangered.

The BLM's 2015 sensitive species list was used to identify sensitive species potentially occurring in the Project Area during the initial field surveys (BLM, 2015). Appendix F presents an assessment of the potential occurrence of special status wildlife species in the Project Area based on the revised 2015 BLM sensitive species list. Special status bird species that have some potential to occur in the Project Area include the short-eared owl, Swainson's hawk (*Buteo swainsoni*), greater sage-grouse, burrowing owl, Cassin's finch, peregrine falcon, ferruginous hawk, rufous hummingbird, fox sparrow, and Brewer's sparrow. Potential habitat for these species was found in the Project Area.

Although yellow cuckoo, wolverine, and lynx appear on the USFWS, USFS and Idaho Fish and Game Species of Concern lists, none of these SOC have ever been observed in the White Knob Mountains. Information regarding special status wildlife species that could possibly occur and have potential habitat within the Project.

The INHP identified no at-risk wildlife taxa in the Project Area, and Mr. Howell indicated in personal communications that it was unlikely that any sensitive wildlife species would be located in the Project Area. Numerous lynx surveys have been conducted in the White Knob Mountains and no sign or observations of lynx have ever been documented. Wolverines have also been surveyed for and have not ever been observed within the White Knob range. He stated that the area is too dry and too disturbed from the mining activities that have occurred over many decades for either of these secretive mammals to occur in this area (Appendix A).

Based on discussions with agency personnel and desktop research using the USFWS iPAC (https://ecos.fws.gov/ecp0/reports/species-by-burrent-range-county), CES assessed the potential for sensitive wildlife species to occur in the Project Area. In May 2017, BLM issued an updated sensitive species list. Preliminary research into the vegetation cover habitats likely for avian SOC to occur in was performed using the GAP National Land Cover Datasets.

5.2 Survey of General Wildlife and Game Species

CES identified the general wildlife habitats based on the vegetation characterization conducted in the Project Area. Topographic features that would be of particular importance to wildlife such as rock outcrops, cliffs, drainages, and water sources, and man-made features such as springs were intensively searched for wildlife and their signs. Based on review of aerial photographs of the Project Area, CES recognized that there is existing surface disturbance throughout large portions of the Project Area. Areas with existing surface disturbance were visited; however, the biological surveys were focused in areas of native habitat. All wildlife and signs (e.g., scat, tracks, feathers, nests, burrows, etc.) detected in the Project Area were recorded.

Elk - C*ervus elaphus* were observed on two occasions and pellets were observed in numerous locations during the surveys.

Moose – *Alces* the largest living deer in North America associated with the northern coniferous forest. Scat and hoofprints were viewed in the Horseshoe Canyon drainage, just past where the surface water disappears into groundwater at 285158, 4863521 (UTM - NAD 83).

Elk and moose often share overlapping habitat. Moose droppings, while typically a bit larger and more oval-shaped, are often the same size and shape as elk droppings, but moose scat usually has a slight dish on one end and a taper on the other. Numerous piles of elk pellets were observed in a variety of settings while CES conducted wildlife surveys. Moose pellets and tracks were found in the Horseshoe Canyon drainage. Two adult elk were observed on the hillside with regenerating shrubs and forbs after a clearcut, east of Bullion Gulch of the Project Area June 9th. A doe white-tailed deer was observed just east of the mine site near Cossack Tunnel. Large numbers of elk pellet groups and tracks were found in forested and regenerating forest parts of the Project Area. Two groups of moose pellets and tracks were observed in the Horseshoe Canyon area just where surface water disappears into the ground.

Uinta ground squirrel – Darker and larger than the Richardson Ground Squirrel, and the underside of its tail is gray instead of ochre-buff. The tail of the Richardson's Ground Squirrel is clay colored to buffy below. Approximately 35 individuals were viewed during the two weeks of field studies.

The yellow-bellied marmot – *Marmota flaviventris* has a distinct yellowish or burnt-orange belly. It is often seen snoozing on warm rocks in the sun after they emerge from their burrows. They spend about 80% of their time in their burrows and they hibernate for eight months of the year. Their alarm call is a loud chirp, which may vary in duration and intensity depending on the nature of the threat. The back is tawny or yellow-brown, grizzled by the light tips of the guard hairs. The feet and legs are blackish brown. The head has whitish-gray patches across the top of the nose, from below the ear to the shoulder and from the nose and chin toward the throat, which leaves a darker brown patch surrounding the ear, eye, and upper cheek on each side of the face. The ears are short and rounded, and the whiskers are dark and prominent. Their habitat is large rocks, either in the form of talus or outcrops. It eats herbaceous or grassy vegetation that must be available within a short distance of the den. Two large individuals were observed on different days near rock outcrops adjacent to the low sagebrush shrubland near Cossack Tunnel.

Golden-mantled Ground Squirrel – *Spermophilus lateralis'* stripes stop short of this ground squirrel's neck, as opposed to all chipmunks, which have stripes running through their cheeks. This ground squirrel has bold, buffy-white eye rings which frame its eyes. They are found in talus slopes and have high-pitched cries. The head and front of the shoulders are a rich chestnut color. The buffy-white eye ring is broken toward the ear. Two black stripes on either side of a white strip run along each side from the top of the shoulder to near the top of the belly. Feet are pinkish buff to creamy white. The top of the tail is blackish, bordered with cinnamon-buff. This squirrel inhabits montane and subalpine forests wherever rock outcrops or talus slopes provide adequate cover. Approximately ten individuals were viewed at the higher elevations of the Project Area near the open pit mine.

Red Squirrel – *Tamiasciurus hudsonicus* does not hibernate, as it needs to store massive amounts of food in winter caches. This leads to its antagonistic disposition as a result of having to continuously protect its food resources for the long winters. The shiny, clove brown, summer coat has a central reddish wash along the back. A black longitudinal line on each side separates the dorsal color from the grayish to white underparts. The longest tail hairs have a black subterminal band and buffy tip, giving the tail a lighter fringe. Boreal coniferous forests and mixed forests are the main habitat (Fisher, et al. 2000). Several squirrels were seen during the field surveys.

Least Chipmunk – *Tamias minimus* was viewed within the Douglas-fir coniferous woodlands, often using fallen logs as runways and the leaf litter as its pantry. Approximately 10 individuals were viewed during the field surveys. It is one of the most commonly seen chipmunks in parts of the Rockies. These chipmunks spend little time in tall trees, but prefer the ground, where they bury food and dig golf ball sized entrances to their networks of tunnels. There are three dark and two light stripes on its face, and five dark and four light stripes on its body. The central dark stripe runs from the head to the base of the tail, but the other dark stripes end at the hips. The overall color is grayer and paler than other chipmunks, and the underside of the tail is yellower. The tail is more than 40 percent the total length. The least chipmunk inhabits open coniferous forests, sagebrush flats, rocky outcroppings, and pastures with small shrubs. It dines on ripe berries, such as chokecherries, strawberries, raspberries, or blueberries. Other staples in the diet include nuts, seeds, grasses, mushrooms, and small insects. It may predate eggs and nestling birds during nesting season.

Mountain Cottontail Rabbit – *Sylvilagus nuttallii* spend their days in hideouts called "forms," which are dug out depressions, and come out to graze on succulent vegetation in the early morning hours and in the evenings from beneath impenetrable vegetation or under rocks, boards, or buildings. They have small home ranges that seldom exceed the size of a baseball field. Mountain cottontails do not hibernate during winter. This rabbit has dark, grizzled, yellowish-gray upper parts and whitish underparts year-round. The tail is blackish above and white below. The ears are usually held erect when the rabbit runs. These rabbits like edge habitats where trees meet meadows or where brushy areas meet agricultural land. Most of the rabbit pellets encountered during the Empire Mine surveys were located in edge habitats between sagebrush and conifers. Only one individual was observed, but rabbit pellets were observed several times.

5.3 Surveys of Special Status Avian Species

CES performed focused surveys for special status avian species in the Project Area.

5.3.1 Target Species Identification

Primary targets for avian point counts were species listed by USFWS, Idaho Fish and Game, and the Salmon-Challis Forest. Final decisions on the target species during this preliminary survey effort were made after consultation with avian specialists in the Mackay area. For each SOC, CES researched bird occurrence data, breeding periods and likelihood of species' presence after analysis of vegetation habitat types. Bird occurrence data were obtained from the Avian Knowledge Network (http://www.birdscanada.org/birdmon/default/datasummaries.jsp).After researching habitats and breeding (and nesting) seasons, targeted point count surveys were conducted for the 20 SOC listed below by the US Federal Wildlife Service (USFWS) that could occur within the Project Area boundaries.

- Bald Eagle – Wintering
- Black Rosy-finch – Year-round
- Brewer's Sparrow – Breeding
- Calliope Hummingbird – Breeding
- Cassin's Finch – Year-round
- Ferruginous Hawk – Year-round
- Fox Sparrow – Breeding
- Greater Sage-grouse – Year-round
- Green-tailed Towhee – Breeding
- Lewis's Woodpecker – Breeding
- Loggerhead Shrike – Breeding
- Long-billed Curlew – Breeding
- Olive-sided Flycatcher – Breeding
- Peregrine Falcon – Breeding
- Rufous Hummingbird – Migrating
- Sage Thrasher – Breeding
- Short-eared Owl – Breeding
- Swainson's Hawk – Breeding
- Western Grebe – Breeding
- Willow flycatcher – Breeding

5.3.2 Survey Methods

A systematic survey plan for the avian species point-counts was prepared based upon four general types of vegetation community cover exist within the Project Area , which include the following (in order of size of coverage):

- Cool semi-desert Scrub and Grassland
- Cool temperate forest
- Recently disturbed or modified
- Temperate grassland, meadow, and shrubland (small amounts)

To account for potential migratory birds, point counts were accomplished by establishing stations via GPS separated by at least 250 meters in different vegetation community habitats and near edge habitats. Research into the habitat requirements for each of the twenty SOC determined which target species were focused at each point-count station. Counts began at least 15 minutes before sunrise each day. Information was collected for every observation, including estimated distance and

habitat community. The date, cloud cover, wind speed, and start/end times were also noted. Stations were mapped using a handheld GPS unit.

All bird species observed in the Project Area were recorded and their behavior was noted. Binoculars were used to scan for the presence of nests and transects were walked to flush birds from nests within the Project Area.

In addition to noting all bird species observed in the Project Area and recording the locations of any nests found during other surveys, CES established and ran five point -count bird survey transects and established stations following the protocol provided by the Great Basin Bird Observatory (GBBO, 2003). CES utilized a habitat-specific, fixed-radius point count survey design, meaning that each point count station is entirely set within one habitat type and only the bird sightings made within 100 meters of the surveyor are typically used for analyses. Point count stations were established in five distinct vegetation community types. A handheld GPS unit was used to locate each point count station. As shown on Figure 8, the five avian point count stations were established at the following locations:

- **Station 1**: In edge habitat between fairly continuous Inter-Mountain Low Sagebrush and Douglas-fir habitat adjacent to Horseshoe Canyon drainage and near intersecting roadway. Station 1 was established on a north-facing low sagebrush hill adjacent to the stream in Horseshoe Canyon, with the hope that the fresh water would attract birds. Adjacent to the stream is a large stand of Douglas-fir.

- **Station 2**: In fairly uniform Inter-Mountain Basins Big Sagebrush/Low Sagebrush Shrubland meadow habitat south of the Cossack tunnel mine area. During the owl surveys, transects were walked in the adjacent edge habitat with Douglas-fir conifer habitat as well. This station was much lower in elevation as well as a distinct type of vegetation community from Station 1.

- **Station 3**: In fairly uniform Douglas-fir habitat between Horseshoe Canyon and Bullion Gulch of the Project Area. Station 3 was also near the open talus in Bullion Gulch where it was hoped raptors may have been hunting for rodents in the talus.

- **Station 4**: In high elevation edge habitat between Douglas-fir, mixed with a few individual Subalpine fir and Engelmann spruce conifers, and low sagebrush meadow habitat. This habitat exists just to the west of the Empire open pit mine. Station 4 was established when it was observed that a different suite of birds inhabits this higher elevation.

- **Station 5:** In Harvested Forest-Shrub Regeneration habitat east of Empire open pit mine. Station 5 was established on an open shrubland that overlooks a steep southeast-facing drainage below the mine, where diverse avian sitings included the only raptor, a red-tailed hawk, and a white-throated swift.

Birds observed at each station were recorded, and the distance each bird was from the point count station was determined with an optical range finder. The bird's activity and any evidence of breeding activity (nests, song, presence of young birds, etc.) were noted.

After the early morning point counts, during the sensitive plant and wildlife surveys and during plant community mapping, the vehicle was stopped whenever there was bird song heard or when flyovers occurred. Binoculars were used to attempt to locate birds heard audibly, or if a flyover occurred, a line of sight was attempted to achieve visual accuracy. These sightings have been grouped together into two main areas: the open ridgeline of regenerating shrubs and forbs after a clear cut of conifers and near the open pit mine.

5.3.3 Avian Survey Results

The avian species observed or heard were tabulated for each station (Table 6).

Multiple sightings occurred of Brewer's sparrows (*Spizella breweri*), a BLM sensitive species, and Bird Species of Conservation Concern as identified by USFWS (USFWS, 2017). Like Brewer's sparrow, most species of sparrows observed in the Project Area are warm season residents, such as Fox sparrow (*Passerella iliaca*), also a USFWS and BLM SOC. Sage sparrows (*Amphispiza belli*), another SOC, may remain in the area year-round. The varied thrush (*Ixoreus naevius*) observed in Douglas-fir (*Pseudotsuga menzeisii*) near Bullion Gulch on June 9, 2017, represents a migrant species passing through the area. Cassin's finch, USFWS SOC (2017), is a year- round resident. Several Cassin's finches were observed in the Project Area. These were observed at Station #1, on the open ridgeline east of Bullion Gulch, and on the sagebrush meadows north of the open pit mine.

Other birds commonly recorded in the area included dark-eyed juncos, yellow warblers, ruby-crowned kinglets, mourning doves, and sage thrashers (*Oreoscoptes montanus*). The sage thrasher and Brewer's sparrow are BLM sensitive species (BLM, 2011).

A number of fox sparrows, sage sparrows, and Brewer's sparrows were heard and observed in the Inter-Mountain Basins Low Sagebrush Shrubland habitat in the Cossack Tunnel area. Brewer's sparrows, another USFWS SOC and BLM sensitive species, were recorded with some frequency in the Inter-Mountain Basins Low Sagebrush Shrubland habitat and in the open meadows adjacent to the Douglas fir stands in the Project Area. Floyd et al. (2007) noted Brewer's sparrows occur wherever sagebrush habitat is present, "from basin bottoms to mountain meadows." The Brewer's sparrow as well as the sage sparrow, the burrowing owl, golden eagle, ferruginous hawk, Swainson's hawk, short-eared owl, and greater sage-grouse are all identified as Bird Species of Conservation Concern by USFWS.

Mourning doves (*Zenaida macroura*), listed by the USFWS as a "game bird below desired condition," were heard several times near Station 2 on a low sagebrush-juniper slope and observed once. Game birds below desired condition are species whose populations are below long-term averages or management goals, or for which there is evidence of declining population trends (BLM, 2015).

A red-tailed hawk was at observed circling around Station 5 for approximately 30 minutes. Station 5 is an area of dense Douglas fir conifers and an open knoll with low sagebrush within the Project Area. The sagebrush knoll has regenerating vegetation after a clearcut on a slope comprised of snowberry, lupine, low sagebrush. The slope was too steep (45-70 percent slopes) to investigate where the nest might be but most likely it was in a dense Douglas fir stand near the aerial tramway headhouse. This species is protected under the Idaho IDAPA – protection-nongame program (Appendix A).

In addition to the red-tailed hawk, two turkey vultures were viewed flying over the sagebrush meadow area. To assess owl and other nocturnal wildlife use of the area, several owl-calling and spotlighting transects were walked in this same general area of the sagebrush meadow. No long- or short-eared owls responded to these calls; however.

5.3.4 Intensive Surveys of Selected Species

Three avian SOC, two owls and the greater sage-grouse, were targeted for more intensive surveys due to concerns about declines in their long-term population trends in this particular section of Central Idaho.

The Project Area is within the range of federal candidate species greater sage-grouse and dedicated surveys for evidence of greater sage-grouse use were conducted. To assess the use of the Project Area by greater sage-grouse, a CES biologist walked suitable habitat in the entire Project Area in a series of transects spaced 500 feet apart as required by BLM protocol within the sagebrush meadow, searching the area for greater sage-grouse or greater sage-grouse signs (e.g., pellets, feathers, tar, tracks, nests, eggshells, etc.). Areas of potential habitat, including a reclaimed area within the mine that now supports Inter-Mountain Basins Big Sagebrush Shrubland, were searched. Disturbed areas lacking sagebrush and areas that included relatively dense juniper were not searched, as these areas do not represent potential greater sage-grouse habitat.

Since the Project Area contains minimal but possible suitable habitat for short-eared owls (*Asio flammeus*), surveys were completed; point count methodology was used. Surveys began 30 minutes before sunset and ended 30 minutes after sunset. Point count stations were established throughout suitable habitat (e.g. meadows, native grass prairies, wetlands, and brushy grasslands). Preliminary desktop GIS work revealed that the sagebrush habitat in the lower elevations of the Project Area held the only possible suitable habitat; the point count station was established for sunset point counts.

Owl and nocturnal wildlife surveys were conducted by establishing several nocturnal owl-calling stations. Transects were established in areas with sagebrush meadows, the most likely habitat where short-eared owls and burrowing owls could occur within the Project Area. Owl calling and spotlighting stations were established at 0.2-mile intervals in a rectangular transect so as to encompass the edge habitat between the low sage shrubland and Douglas-fir woodland. At each station, the observer listened for any owl calls for a period of at least two minutes. Taped calls of burrowing owl and short-eared owl (*Athene cunicularia* and *A. flammeus*, respectively) were broadcast using the Audubon Guide app and the observer listened for responses for another two minutes. The calls were then played a second time, followed by another two-minute listening

period. Calling was initiated with the onset of darkness and continued until the transect was completed (typically about one hour).

Greater Sage-grouse

Status: Game species, **Global Rank**: G5, **State Rank**: S4

Range: Previously widespread. Resident locally from central Washington, southern Idaho, Montana, and parts of southern Canada and Great Plains, south to eastern California, south-central Nevada, southern Utah, western Colorado and northern New Mexico.

Habitat: Found in foothills, plains and mountain slopes where sagebrush is present, or in mixture of sagebrush, meadows, and aspen in close proximity. In some areas, suitable winter habitat is probably the most limiting seasonal factor.

Greater sage-grouse may not require open water if succulent vegetation is available, but they use free water if it is available. For example, during the winter in Eden Valley, Wyoming, greater sage-grouse were observed regularly visiting partially frozen streams to drink from holes in the ice. In desert regions, when succulent vegetation is sparse, sage-grouse distribution may be limited to areas near water. Part of the reason that no greater sage-grouse were observed during the June 2017 wildlife surveys could be due to the lack of surface water within the Empire Mine Project Area. The only surface water encountered during the surveys was in a small stream within Horseshoe Canyon.

Sage-grouse are totally dependent on sagebrush communities. Sagebrush is a crucial component of their diet year-round, and sage-grouse select sagebrush communities almost exclusively as cover, Sage-grouse habitat requirements vary seasonally. Sage-grouse use sagebrush of different heights and canopy cover ranging from 10 to 31 inches (25-80 cm) in height. Taller, denser shrubs that provide horizontal and vertical cover are used during nesting in spring, and also in winter. Sage-grouse rely heavily on the diverse herbaceous plants within, and nearby, sagebrush communities for food and cover during the pre-laying, nesting, and early brood-rearing periods. Sage-grouse may use a variety of non-sagebrush habitats intermixed in a sagebrush-dominated landscape during summer—particularly non-sagebrush shrub-herbaceous, wetland, and riparian communities—so the composition and configuration of habitats also determines habitat quality for sage-grouse (https://www.fs.fed.us/database/feis/animals/bird/cent/all.html#PreferredHabitat).

Ecology: Builds concealed nest in depression on ground under sagebrush. Forages in foliage, or on ground. Lek breeder; up to 400 males may display in area 0.8 km long. In Idaho, populations may move 0.2-81.0 km from summer to winter range. Agricultural areas are important component of summer range; sagebrush stands are more important in winter. In Idaho study, nesting success was higher in sagebrush versus non-sagebrush sites. Other investigations by Idaho Fish and Game are examining the impact of wildfire in shrub steppe on sage grouse.

Reported Sightings in Idaho: The closest eBird sighting to the Project Area is of three eggs in Sheep Canyon, Custer County, Idaho in May 2015.

Project Area Survey Results: No threatened or endangered species are known to occur or were observed in the Project Area. No greater sage-grouse or greater sage-grouse sign were detected during the June 2017 surveys and no sightings are listed on eBird within that last 95 days within 30 miles of Mackay, Idaho.

No sage grouse were detected during the pedestrian surveys. The most suitable habitat for greater sage-grouse within the Project Area is within the low sagebrush meadow near Cossack Tunnel. A large portion of this area is fragmented from past cattle grazing and existing surface disturbance. Areas of sagebrush that remain in the Packard Flat area are being encroached upon by juniper trees on the west side and Douglas-fir on the east side and the overall quality of the habitat is low for greater sage-grouse in the Project Area.

Short-eared Owl

Status: Protected Nongame Species, **Global Rank:** G5, **State Rank:** S5, NTMB

Range: Breeds from northern Alaska, east to northern Labrador, and south to California, Utah, Colorado, parts of Midwest, and Virginia. Winters mostly from southern Canada, south to southern Baja California, southern Mexico, Gulf Coast, and Florida.

Habitat: Found in open country in prairies, meadows, tundra, moorlands, marshes, savannas, dunes, fields, and open woodlands.

Diet: Eats mainly rodents (commonly voles), but will also eat small birds, insects, and other small mammals.

Ecology: Nests in depression on ground. Both sexes perform distraction displays. Breeding density in different areas has been reported at 0.6-6 pairs per square kilometer. Reported average home range size is 15-200 ha. Roosts by day on ground, on low open perch, under low shrub, or in conifer. Somewhat gregarious in winter; groups may gather where prey is abundant. May defend feeding territory in winter. Forages primarily by flying low (typically into wind), and dropping down onto prey, sometimes after hovering briefly. Will forage day or night; may favor late afternoon and early evening. Recent study in southwestern Idaho reported 7% mortality rate in nestlings.

Reported sightings within Idaho: eBird reports that a short-eared owl was observed in Lemhi County, June 20, 2018, at Warm Springs Creek, 25 miles northeast of Mackay. It is the closest recorded sighting on eBird (http://ebird.org/content/ebird/).

Project Area Survey Results: No occurrences of the short-eared owl were observed or heard.

Burrowing Owl

Status: Protected nongame species, **Global Rank:** G4, **State Rank:** S3, NTMB

Range: Breeds in southwestern Canada, south through western U.S., central Mexico, and central and southern Florida, to much of South America (locally). Withdraws from northernmost portions of breeding range in northern winter. Winters regularly south to portions of Central America.

Habitat: Found in open grasslands (especially prairies, plains and savannas), and sometimes in open areas such as airports or vacant lots near human habitation. In southern Idaho, nests in sagebrush steppe and agricultural lands. DIET: Feeds primarily on large insects (especially in warmer months) and rodents. Sometimes eats birds and amphibians.

Ecology: Primarily nocturnal in winter in northern range, diurnal and crepuscular in summer. Catches prey in flight or drops to ground. Nests and roosts in burrow dug by mammal or owl. May mimic rattlesnake if disturbed in burrow. Territory defense is mainly limited to immediate vicinity of nest burrow; may share foraging area. Badger plays important role in nesting ecology in Idaho—provides nest burrows and is a major predator.

Reproduction: Female incubates 6-7 eggs (on average), for 27-30 days. Male provides food during incubation and early nestling stages. Young (average of 3-5 fledglings) run and forage at 4 weeks, are capable of sustained flight at six weeks, and first breed at one year (some may not). Female generally produces one brood/yr. (NatureServe 2017).

Project Area Survey Results: The greater sage-grouse surveys were also used to search the area for burrowing owl (*Athene cunicularia*) habitat and nests. Potential burrowing owl habitat (open habitats with good visibility, particularly areas of cheatgrass and clasping pepperweed in the Invasive Annual and Biennial Forbland habitat, were identified during the greater sage-grouse surveys. When potential habitat was encountered, the survey transect spacing was tightened to thoroughly search these areas for burrowing owls. Potential burrowing owl habitats were searched for the presence of burrowing owls themselves or burrows that might be used by the species. Specifically, burrows used by burrowing owls may be marked by whitewash, feathers, pellets, and prey remains, including insect parts. Burrowing owls often also "decorate" the entrances to their burrows with pieces of cow manure (Johnsgard, 1988). Surveys for burrowing owl and other ground and shrub nesting raptors were not performed outside of the Project Area. No occurrences of the burrowing owl were observed or heard.

6.0 SUMMARY

Baseline biological surveys were performed in the approximately 700-acre Project Area during two week-long site visits in June 2017. The surveys included vegetation community mapping, floristic inventory, noxious weeds and invasive, non-native plant species survey, special status plant species survey, general wildlife and game species survey, special status wildlife species survey (including short-eared owl), migratory bird point count survey, and a wetland delineation of the Horseshoe Canyon drainage. The surveys were timed so as to have the best opportune timing to capture sightings and vocalizations of as many migratory avian species that might be in the area of the Empire Mine.

The vegetation within the Project Area was categorized into eleven primary vegetation communities. The four most prominent vegetation communities in the Project Area are Pseudotsuga menziesii / Symphoricarpos oreophilus Forest, Populus tremuloides - Pseudotsuga menziesii/Symphoricarpos oreophilus Forest Quaking Aspen, Cercocarpus ledifolius/Festuca

idahoensis Woodland, or Curl-leaf Mountain-mahogany/Idaho Fescue Woodland, and Inter-Mountain Basins Low Sagebrush (Artemisia arbuscula) Shrubland.

CES performed a special status plant species survey in the Project Area during the appropriate time of year when special status plant species would be visible and identifiable. CES visited areas where potential habitat for target species was believed to occur based on the pre-field review of maps, aerial photographs, and other data. Only one special status plant, Whitebark Pine (*Pinus albicaulis*), a tree species of high elevations, was observed during the survey, and no habitat is available within the Project Area for other special status plant species. The Whitebark Pine is a Candidate species with the USFWS, and is a SOC with the BLM, USFS, and Idaho Fish & Fame. During the pre-field assessment, it was determined that there could be potential habitat for the *Astragalus diversifolium* and *Eriogonum crosbaeye*. Neither of these species was located; however, close congener (related) species were located. Additionally, minimal habitat was found for any other of the special status plant species that were included in the pre-field assessment the Project Area.

CES performed a survey for noxious weeds and invasive, non-native species. The area was remarkably weed-free, especially considering how often repeated disturbance has taken place within Project Area.

The investigation revealed uplands and narrow riverine wetlands within Horseshoe Canyon and within the Project Area. A total of 0.51 acres of wetland were found within the Project Area. It is CES' opinion that this reach of stream with surface water could not be considered jurisdictional because the Horseshoe Canyon Drainage does not constitute a hydrologic connection to the Big Lost River. The USACE has final jurisdiction over determining whether an isolated water body or wetland is subject to interstate commerce and is, therefore, a "water of the United States."

The diverse range of vegetation communities in the Project Area provides habitat for a variety of common wildlife and game species that occur throughout the central Idaho sagebrush shrublands and coniferous forests including rodents, birds, and mammals. The vegetation in the Project Area provides dependable herbivorous food staples and sheltering functions to burrowing and denning wildlife. Thorny shrubs and moderately sized trees found throughout the Project Area provide nesting structure, protection from predators, and thermal cover for many wildlife species. The Project Area also provides foraging habitat for raptors and mammals. The scant surface water resources enhance the habitat value for wildlife in the Project Area. Elk were observed and one moose sighting was reported. Moose hoof prints were observed in Horseshoe Canyon. No mule deer or white-tail deer were observed during the game species wildlife surveys in June.

Multiple sensitive avian species were observed or heard during the avian point count surveys, including the following:

- Brewer's sparrows (*Spizella breweri)*
- Fox sparrow (*Passerella iliaca*)
- Sage sparrows (*Amphispiza belli*)
- Varied thrush (*Ixoreus naevius*)

- Cassin's finch (*Haemorhous cassinii)*
- Sage thrashers (*Oreoscoptes montanus*)
- Red-tailed hawk (*Buteo jamaicensis*)

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http://ecos.fws.gov/tess_public/pub/stateOccurrenceIndividual.jsp?state=ID
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TABLES

Table 1. 30-year Normal Monthly and Annual Precipitation and Temperature Values, 1981-2010

Month	Precipitation	Average Temperature		
		Minimum	Mean	Maximum
	inches	degrees Fahrenheit		
January	2.22	12.8	20.2	27.6
February	1.96	12.4	21.3	30.1
March	2.45	17	26.7	36.4
April	2.26	21.8	32.9	44.1
May	2.58	29.9	41.1	52.3
June	2.05	37.5	49.0	60.6
July	1.20	46	58.5	70.9
August	1.02	45.4	57.8	70.2
September	1.20	38	49.4	60.8
October	1.69	28.6	38.4	48.2
November	1.96	17.8	25.5	33.3
December	2.54	11.7	18.9	26.2
Annual	23.13	26.6	36.6	46.7

Notes:

Estimates were generated for site (latitude 43.8828 degrees north, longitude -113.6746 degrees west, elevation 8,481ft) using PRISM model with 800-meter grid resolution on May 19, 2017.

http://www.prism.oregonstate.edu/documents/ PRISM_datasets.pdf

Table 2. Vegetation Species Checklist for Project Area

NRCS Plant Code	Scientific Name	Common Name	Location
Trees			
ABLAL	*Abies lasiocarpa*	Subalpine fir	8500-9200 feet at top
CELE3	*Cercocarpus ledifolius*	Curlleaf mtn.mahogany	east-facing slopes
JUCO	*Juniperus communis*	common juniper	under Douglas-fir on st
JUOS	*Juniperus osteosperma*	Utah juniper	dry, lowest elevations
POTR	*Populus tremuloides*	Aspen	small patch by #6
PSME	*Pseudotsuga menziesii*	Douglas-fir	most common conifer, forms wide swaths over much of the project area
PIEN2	*Picea engelmannii*	Engelmann spruce	highest elevations, near 8500-9000'
SADR	*Salix drummondii*	Drummond's willow	Horseshoe Canyon
SAEX	*Salix exigua*	Narrowleaf willow	Horseshoe Canyon
SAGE2	*Salix geyeriana*	Geyer’s willow	Horseshoe Canyon
PIAL	*Pinus albicalis*	White bark pine	highest elevations with
PIFL2	*Pinus flexilis*	Limber pine	ridgeline near clear cut
Shrubs			
AMAL2	*Amelanchier alnifolia*	Western serviceberry	Uncommon on shady sites
ARAR8	*Artemisia arbuscula*	Low sage	mid-elevations
ARCAV2	*Artemisiacanaviscidula*	Silver sage	low elevation in moist soils
ARLU	*Atemisia ludoviciana*	White sagebrush	low elevation in moist soils
ARNO	*Artemisia nova*	Black sage	highest elevations on windswept slopes
ARTRS2	*Artemisiatridentataspp. Spiciformis*	Big sagebrush	highest elevations
ARTRW8	*Artemisiatridentatavar. wyomingensis*	Wyomingbigsagebrush	low to high elevations with deep soils
PRVI	*Prunus virginiana*	Common chokecherry	low-low elevations and along drainages
PUTR2	*Purshia tridentata*	Antelope bitterbrush	low elevations
RICAU	*Ribes aureum*	Golden currant	Horshoe Canyon
RICE	*Ribes cerneum*	Wax current	Compressor station
RIIN2	*Ribes inerme*	Whitestem gooseberry	Horseshoe Canyon and Bullion Gulch
ROWO	*Rosa woodsii*	Wood’s rose	moist soils
RUID	*Rubus idaeus*	Americanredraspberry	Bullion Gulch, disturbed soils

NRCS Plant Code	Scientific Name	Common Name	Location
SYAB	*Symphoricarpos albus*	Common snowberry	Common with sagebrush
SYOR2	*Symphoricarpos oreophilus*	Mountain snowberry	Common with other mountain brush species
Forbs			
ACMI2	*Achillea millefolium*	Common yarrow	Common in drier sites,
AGGL	*Agoseris glauca*	Pale agoseris	Disturbed dry soils
ANCO	*Anthemis cotula*	Mayweeed chamomile	Colonizing roadside by Henderson Cyn
ANMI13	*Antennaria microphylla*	Rosy pussytoes	High elevation
ARABI2	*Arabis*	Rockcress	moist soils near disturbed sies
ARFEF3	*Arenaria fendleri*	Fendler's sandwort	High elevation
ARDR4	*Artemisia dracunculus*	Tarragon	near stream
ARLA8	*Artemisia ludoviciana*	White sagebrush	near stream
BASA	*Balsamorhiza saggitata*	Arrow-leaf balsamroot	Common on sunny slopes
CAFL	*Castellija flava*	Yellow lupine	Occasional on open slopes, high elevation
CALI4	*Castilleja linariifolia*	Wyoming paintbrush	Sagebrush communities
CIAR4	*Cirsium arvense*	Canada thistle	moist soils near disturbed sies
CIAR4	*Cirsium foliosum*	Elk thistle	High elevation
COLI2	*Collomia linearis*	Tiny trumpet	Uncommon on open slopes
CISC2	*Cirsium scariosum*	Meadow thistle	Open sagebrush
CYPU	*Cymopterus purpurescens*	spring parsely	Occasional in deep soils
HAPA	*Hackelia patens*	Spotted Forget-me-not	Dry, open slopes in sagebrush
HEPA10	*Heuchera parviflora*	Little flower alumroot	shady cliffsides
DEINP	*Descurania incana ssp. Procera*	Mountain tansymustard	Disturbed sites
LEPU11	*Leptodactylon pungens*	Common prickly phlox	Open gravelly slopes
IPAG	*Ipomopsis aggregata*	Scalett gilia	Uncommon in open slopes
LIPE	*Linum perenne*	Wild flax	Sagebrush openings
LUAR	*Lupinus arbustus*	Yellow lupine	High elevation - open slopes
LUAR	*Lupinus argenteus*	Silvery lupine	Open slopes
OEPA	*Oenothera pallida*	Evening primrose	Open, dry slope
TOP2	*Townsendia parryi*	Parry's townsedia	Open slopes
PA	*Packera species*		
MECI	*Mertensia ciliata*	Bluebells	Rich soils

NRCS Plant Code	Scientific Name	Common Name	Location
PHHA	*Phacelia hastata*	Cordilleran phalcelia	Uncommon, drier slopes
PHSE	*Phacelia sericea*	Silky phacelia	Uncommon near rideline edge #6
PHLOX	*Phlox longifolia*	Longleaf phlox	Open slopes
PHLOX	*Phlox - Leptodactylon*	Prickly phlox	Open slopes
POAR7	*Potentilla arguta*	Tall cinquefoil	damp soils
PODI2	*Potentilla diversifolia*	Varileaf cinquefoil	moist soil
POGR	*Potentilla gracilis*	Beauty cinquefoil	Uncommon under confiers
SILA21	*Silene latifolia*	Bladder campion	Uncommon high elevation
ROWO	*Rosa woodsii*	Wood rose	near open stream
TAOF	*Taraxacum officinale*	Common dandelion	open sunlight, disturbed areas
VIPU	*Viola purpurea*	Goosefoot Violet	Uncommon under confiers

Table 3. Special Status Vegetation Species

Scientific Name	Common Name	Known Habitat	Global and State Status	Potential to Occur in Study Area
US FWS Candidate Plant Species				
Pinus albicaulis	Whitebark Pine	Occurs on upper subalpine forests only, weakly developed (immature) soils, growing on steep slopes and windy exposures in subalpine and alpine habitats. It is often an early to mid-seral species. It grows with other cold and wind tolerant alpine trees such as lodgepole pine (P. contorta), Englemann spruce (Picea engelmannii), and subalpine fir (Abies lasiocarpa).	G3 - Vulnerable	Likely
Forest Service Sensitive Plant Species				
Lewisia sacajaweana	Sacajawea's bitter-root	Montane and subalpine habitats ranging from 5,000 to 9,500 feet. The plant is dormant most of the year, like its relative, the common bitterroot, *Lewisia rediviva* (Montana's state flower). Shortly after snowmelt, a rosette of succulent leaves emerges, followed by showy white flowers that hug the ground	G2, S1 – Imperiled Also - BLM Sensitive Species – Type 4	Unlikely
Primula incalina	Bluedome primrose	Occurs in wet, alkaline meadows, at the headwaters of spring-fed creeks in the large, intermontane valleys of east-central Idaho. Soils in the meadows are alluvial, alkaline, fine-textured, light-colored, and derived from outwash from the predominantly carbonate rocks of the Beaverhead, Lemhi, and Lost River ranges.	G2, N2	Unlikely
Draba trichocarpa	Stanley whitlow-grass	12 small occurrences in the Sawtooth Valley, near Stanley, in central Idaho.	NNR	Unlikely

Scientific Name	Common Name	Known Habitat	Global and State Status	Potential to Occur in Study Area
Forest Service Sensitive Plant Species				
Astagalus diversifolius	Mesic milkvetch	Apparently quite rare. Currently known only from southeastern Idaho (valleys of the Lost and Lemhi Rivers, and upper Snake River Plains), Great Divide Basin, Wyoming. Threatened by habitat loss to agriculture and livestock. grazing.	G2 - Imperiled N2 - The Idaho Conservation Status Rank has increased from S2 (imperiled) to S1 (critically imperiled), so it is possible that it is declining in this state	Possible (known occurrence 20 miles away from Project Area)
Forest Service Watch Plant Species				
Eriogonum meledonum	Guardian buckwheat	Endemic to a section of the Sawtooth Valley, centered around Stanley Idaho	G2, N2	Unlikely
BLM Sensitive Species				
Eriogonum crosbyae aka E. capistratum var. welshii	Crosby's wild buckwheat	Mountain ranges of central Idaho (Blaine, Butte, Camas, Custer, and Lemhi counties) and in western Montana (Deer Lodge and Ravalli counties	G4T2Q, S2, as a BLM Sensitive Type 3 species	Likely

Notes:

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Interviews with agency personnel in May 2017.

Table 4. Idaho Listed Noxious Weeds

Species Code	Scientific Name	Common Name	Location	Frequency
CADR	*Cardaria draba*	hoary cress	Occasional - roadside	Rare
CANU4	*Carduus nutans*	musk thistle	In sage meadow by cattle trough	Rare
CIAR4	*Cirsium arvense*	Canada thistle	Associated with Horseshoe Canyon drainage	Common in wet/moist areas
SOAR	*Sonchus arvense*	Perennial sowthistle	Rare - roadside	Rare
Other Weedy Species				
DEPI	*Descurainia pinnata*	Western tansymustard	Occasional in disturbed sites	Locally common
HAGL	*Halogeton glomeratus*	Halogeton	Dry washes, roadsides	Common
MEOF	*Melilotus officianlis*	Sweetclover	Riparian	Uncommon
SIAL	*Sisymbrium altissimum*	Tumble mustard	Dry washes	Uncommon
SILI	*Sisymbrium linifolium*	Flaxleafed plainmustard	Dry washes	Uncommon
VETH	*Verbascum thapsus*	Mullein	Riparian	Uncommon

Note:

Idaho State Listed Weed List. http://www.idahoweedawareness.net/vfg/weedlist/weedlist.html Accessed June 1, 2017.

Table 5. Wetland Vegetation Species in Horseshoe Canyon

Species Code	Scientific Name	Common Name	Location	Frequency
Trees				
ACGR	Acer grandidentatum	Rocky Mountain maple	Near Sample Site #4	Uncommon
POAC5	Populus acuminata	Cottonwood	Near edge of road and Horseshoe stream	Locally common only
PRVI	Prunus virginiana	Chokecherry	Occasional in riparian zone	Occasional
SAGE2	Salix geyeriana	Geyer's willow	Sample Site 1+2	Common
Shrubs				
RIAU	Ribes aureum	Golden currant	A few individuals within riparian zone	Uncommon
RICE	Ribes cerneum	Squaw currant	Near SS #4	Uncommon
RILA	Ribes lacustre	Prickly currant	Several spots along stream	Common
RILA3	Ribes laxiflorum	Trailing black currant	Most common shrub species in drainage	Frequent
RIVI3	Ribes viscosissimum	Prickly black currant	Near SS #4	Uncommon
ROWO	Rosa woodsii	Wood's rose	South stream edge riparian	Uncommon
SAEX	Salix exigua	Coyote willow	Both N and S edges of stream	Locally common
SARA	Sambucus racemosa	Red elderberry	Sample Site #2 up to SS #3	Uncommon
Forbs				
ACRU2	Actea rubra	Baneberry	Near Sample Site #3	Locally common
ARAN7	Argentina anserina	Silverleaf cinquefoil	Moist soils	Uncommon
CIAR4	Cirsium arvense	Canada thistle	Riparian disturbed	Frequent
GEMA4	Geum macrophyllum	Largeleafed avens	Near stream edge	Uncommon
IVAX	Iva axillaris	Poverty weed	Riparian	Common
MESP3	Mentha spicata	Spearmint	River shoreline	Uncommon
MEOF	Melilotus officinalis	Sweetclover	Near river edge	Uncommon
MEBR	Mertensia brevistylis	Shortstyle bluebells	Uplands near Sample Site #4	Common
STJA	Stellaria jamesiana	Starwort	Transition between upland and riparian	Uncommon

Species Code	Scientific Name	Common Name	Location	Frequency
SAOD2	Saxifraga odontoloma	Brook saxifrage	Sample Site #3 with mosses	Locally common
TAOF	Taxiflorum officinale	Dandelion	Sample Site #2	Uncommon
URDI	Urtica dioca	Stinging nettle	Near road	Uncommon
Graminoids				
AGST	Agrostis stolonifera	Redtop	Riverine edge habitat	Abundant in moist/wet areas of floodplain
BRIN2	Bromus inermis	Smooth brome	Transition zone	Frequent
HOJUJ	Hordeum jubatum ssp. jubatum	Foxtail barley	Disturbed riparian	Uncommon
JUAR2	Juncus arcticus	Arctic rush	Floodplains on N and S sides of stream	Common
VETH	Verbascum thapsus	Mullein	Riparian	Rare

Table 6. Summary of Birds Identified Audibly and Visually

Station	Birds Observed	No.	Notes
S-1	American Robin	2	Flyover, singing
	Brewer's Sparrow	4	1 heard, 1 flyover
	Cassin's finch	1	Singing
	Dark eyed junco	2	1 flyover, 1 in tree
	Sage sparrows	1	1 flyover
	Varied thrush	2	Singing
	Yellow warbler	3	Both singing
S-2	Black-throated gray warbler	1	In trees
	Blue-gray flycatcher	2	flying
	Brewer's Sparrow	5	1 singing
	Chipping sparrow	3	Singing
	Dark-eyed junco	4	Flyover
	Fox sparrow	5	Heard singing
	House finch	1	Singing
	Humingbird	2	Flyover
	Mountain bluebird	1	Flyover
	Mountain chickadee	1	Flyover
	Mourning Doves	6	4 singing; 1 flyover, 1 viewed in juniper
	Sage Sparrow	2	1 singing, one viewed
	Sage sparrows	1	1 flyover
	Say's phoebe	1	Flyover
	Townsend's solitare	1	Singing
	Turkey Vultures	2	Viewed flying and circling over sagebrush
	Western tanager	1	Visual flying
S-3	American robin	2	Flyovers
	American crow	2	Flyover
	Brewer's Sparrow	2	1 singing
	Chipping sparrow	3	Singing
	Dark-eyed junco	2	Flyover
	Dusty flycatcher	1	Flyover
	Hermit thrush	2	Singing
	McGillvary's warbler	1	Singing
	Ruby-crowned kinglet	3	In trees
	Sage Sparrow	1	Singing
	Sagebrush sparrow	2	Flyover
	Varied thrush	6	4 Singing, 2 observed in deep conifers
	Vesper sparrow	2	Singing
	Western tanager	2	In trees

Station	Birds Observed	No.	Notes
S-4	Blue-gray gnatcatcher	1	Flyover
	Cassin's finch	6	Flyover
	Chipping sparrow	1	Singing
	Dark-eyed junco	2	Flyover, perched in conifer
	Flicker	1	In trees
	Golden-crowned kinglet	2	Flyover, singing while perched at top of conifer
	Green-eyed swallows	8	Flyover
	Ruby-crowned kinglet	1	Flyover
	Sagebrush sparrow	2	Perched in sagebrush
	Violet green Swallow	5	3 singing, 2 viewed flying
S-5	Brewer's Sparrow	7	4 singing, 3 viewed
	Cassin's finch	1	Flyover
	Dark-eyed junco	5	2 flyover, 3 singing
	Mountain chickadee	1	Flyover
	Red-tailed hawk	1	Calling, circling around Douglas fir dense conifers
	Ruby-crowned kinglet	1	Flyover
	White-throated swift	1	Flyover

Notes:

Point count station S-1 is located in Horseshoe Canyon at UTM 4863380N, 284802E.

Point count station S-2 is located in Rio Grande Canyon between Empire Mill and Cossack Tunnel at UTM 4863400N, 285998

Point count station S-3 is located along road in Bullion Canyon at UTM 4863246N, 285009E.

Point count station S-4 is located on ridge north of open pit at UTM 4862335N, 285013E.

Point count station S-5 is located on an open area southeast of the open pit at UTM 4862328N, 285865E.

Table 7. Avian Species Checklist

Common Name	Scientific Name	Order	Family	Family Description
American Crow	Corvus brachyrhynchos	Passeriformes	Corvidae	Crows, Jays, and Magpies
American Goldfinch	Spinus tristis	Passeriformes	Fringillidae	Siskins, Crossbills, and Allies
American Kestrel	Falco sparverius	Falconiformes	Falconidae	Falcons and Caracaras
American Robin	Turdus migratorius	Passeriformes	Turdidae	Thrushes and Allies
Bewick's Wren 6/11	Thryomanes bewickii	Passeriformes	Troglodytidae	Wrens
Black Rosy-finch 6/11	Leucosticte atrata	Passeriformes	Fringillidae	Siskins, Crossbills, and Allies
??Black Swift 6/10	Cypseloides niger	Apodiformes	Apodidae	Swifts
Blue-gray Gnatcatcher 6/11	Polioptila caerulea	Passeriformes	Polioptilidae	Gnatcatchers
Boreal Chickadee	Poecile hudsonicus	Passeriformes	Paridae	Chickadees and Tits
Brewer's Sparrow	Spizella breweri	Passeriformes	Emberizidae	Buntings and New World Sparrows
Cassin's Finch	Haemorhous cassinii	Passeriformes	Fringillidae	Siskins, Crossbills, and Allies
Chipping Sparrow 6/11	Spizella passerina	Passeriformes	Emberizidae	Buntings and New World Sparrows
Common Raven	Corvus corax	Passeriformes	Corvidae	Crows, Jays, and Magpies
?Dusky Flycatcher	Empidonax oberholseri	Passeriformes	Tyrannidae	Tyrant Flycatchers
Dark-eyed Junco 6/11, 6/19, 6/20	Junco hyemalis	Passeriformes	Emberizidae	Buntings and New World Sparrows
Fox Sparrow	Passerella iliaca	Passeriformes	Emberizidae	Buntings and New World Sparrows
Eurasian Collared-dove	Streptopelia decaocto	Columbiformes	Columbidae	Pigeons and Doves

Common Name	Scientific Name	Order	Family	Family Description
Golden-crowned Kinglet 6/10, 6/11	Regulus satrapa	Passeriformes	Regulidae	Kinglets
Grasshopper Sparrow	Ammodramus savannarum	Passeriformes	Emberizidae	Buntings and New World Sparrows
(Blue)Gray Flycatcher	Empidonax wrightii	Passeriformes	Tyrannidae	Tyrant Flycatchers
Gray-crowned Rosy-finch	Leucosticte tephrocotis	Passeriformes	Fringillidae	Siskins, Crossbills, and Allies
Hermit Thrush	Catharus guttatus	Passeriformes	Muscicapidae	Thrushes and Allies
House Finch	Haemorhous mexicanus	Passeriformes	Fringillidae	Siskins, Crossbills, and Allies
? Least Flycatcher	Empidonax minimus	Passeriformes	Tyrannidae	Tyrant Flycatchers
? Lesser Goldfinch	Spinus psaltria	Passeriformes	Fringillidae	Siskins, Crossbills, and Allies
MacGillivray's Warbler 6/11	Geothlypis tolmiei	Passeriformes	Parulidae	New World Warblers
Mountain Bluebird 6/10	Sialia currucoides	Passeriformes	Turdidae	Thrushes and Allies
Mountain Chickadee 6/11	Poecile gambeli	Passeriformes	Paridae	Chickadees and Tits
Mourning Dove 6/10, 6/11, 6/20	Zenaida macroura	Columbiformes	Columbidae	Pigeons and Doves
 Northern Flicker	Colaptes auratus	Piciformes	Picidae	Woodpeckers
Olive-sided Flycatcher	Contopus cooperi	Passeriformes	Tyrannidae	Tyrant Flycatchers
Ruby-crowned Kinglet 6/11	Regulus calendula	Passeriformes	Regulidae	Kinglets
Sagebrush Sparrow 6/9, 6/11	Artemisiospiza nevadensis	Passeriformes	Emberizidae	Buntings and New World Sparrows
Savannah Sparrow	Passerculus sandwichensis	Passeriformes	Emberizidae	Buntings and New World Sparrows
Song Sparrow	Melospiza melodia	Passeriformes	Emberizidae	Buntings and New World Sparrows

Common Name	Scientific Name	Order	Family	Family Description
Swainson's Thrush	Catharus ustulatus	Passeriformes	Turdidae	Thrushes and Allies
Townsend's Solitaire 6/11	Myadestes townsendi	Passeriformes	Turdidae	Thrushes and Allies
Turkey Vulture	Cathartes aura	Accipitriformes	Cathartidae	New World Vultures
Varied Thrush 6/8, 6/10	Ixoreus naevius	Passeriformes	Turdidae	Thrushes and Allies
White-throated swift,– on ridgeline south of Bullion Gulch	*Aeronautes saxatalis*	Apodiformes	Apodidae	Swifts
Vesper Sparrow	Pooecetes gramineus	Passeriformes	Emberizidae	Buntings and New World Sparrows
Yellow warbler	Setaphagus petechia	Passeriformes	Parluidae	New World warblers

FIGURES

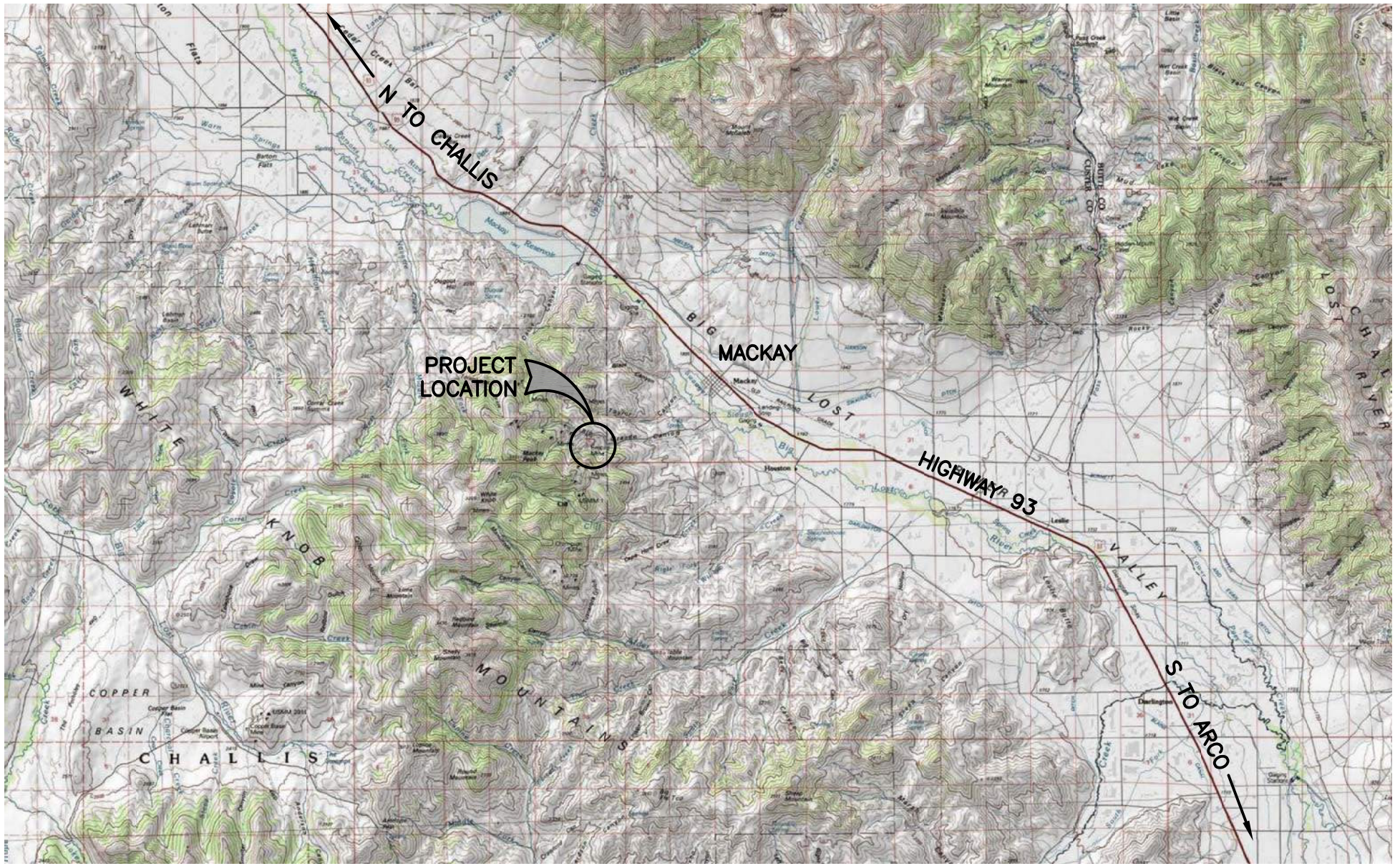


Figure 1. Site Location Map

0 3 mi

1"=3 mi

(LOCATIONS AND SCALE ARE APPROXIMATE)

N

PROJECT NUMBER: 2017220015	Baseline Biological Survey Report Portions of Sec 1&2, T6N R23E; Sec 35&36, T7N R23E Boise Meridian
DATE: 8/8/2017	
DWG NO: 2017220015 FIGURE 1.DWG	Konnex Resources Inc. Mackay, Idaho
DWG BY: 6DJR / PROJECT MANAGER: 5DJB	
REVISED:	CASCADE EARTH SCIENCES

(SOURCE: ©2013 National Geographic Society, i-cubed)

2017220015 Figure 1.dwg August 11, 2017 BD701479

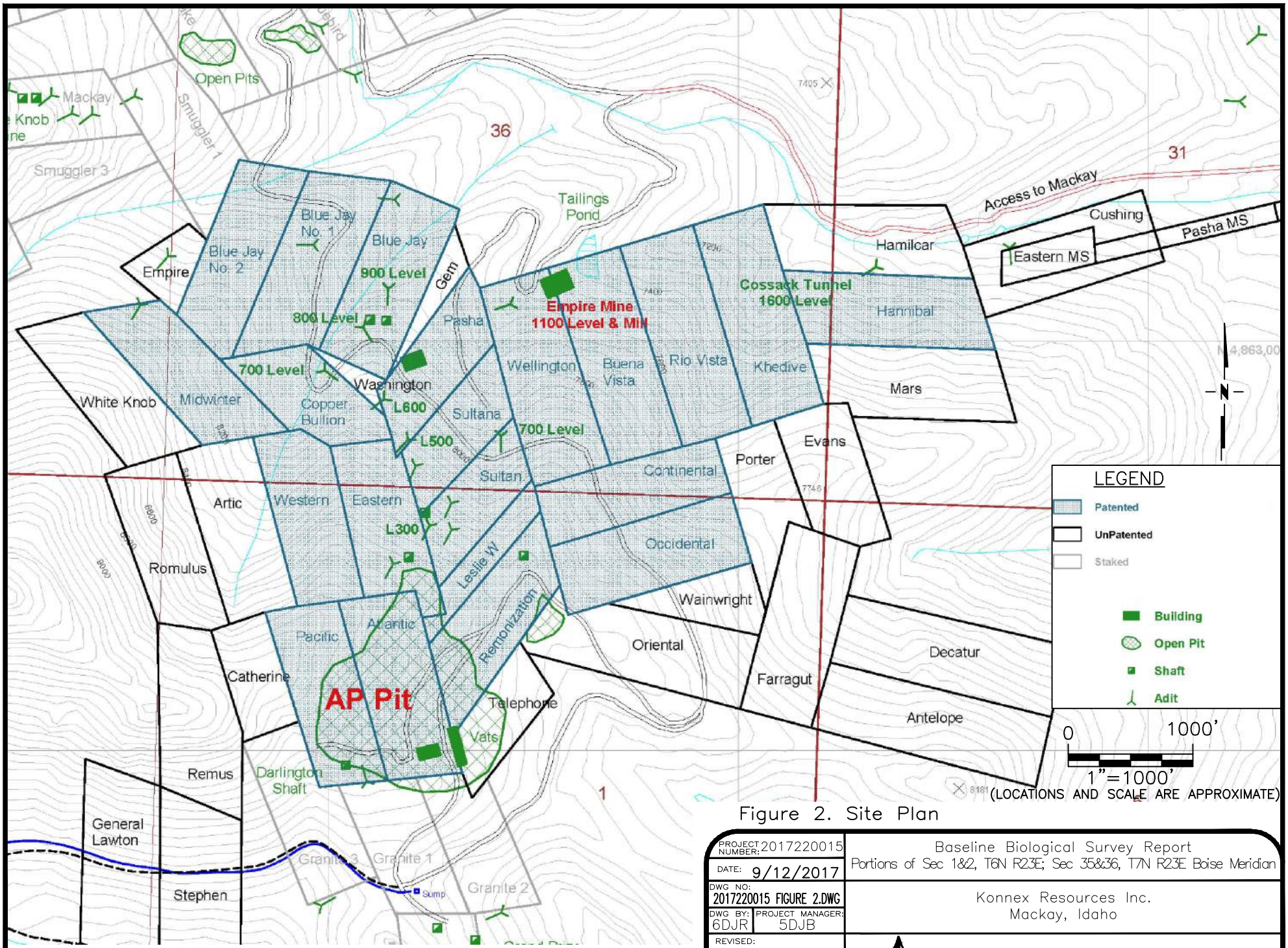
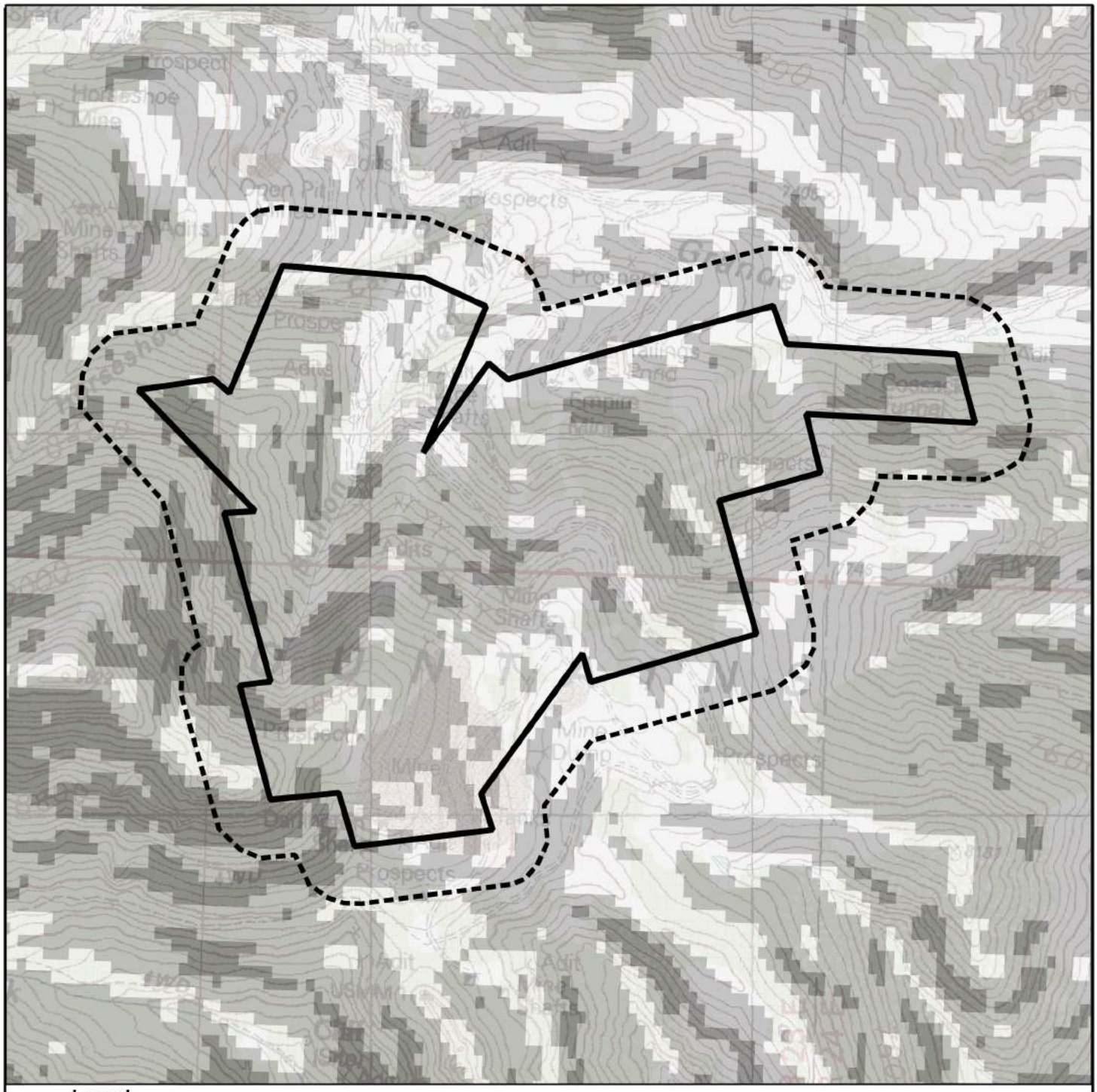


Figure 2. Site Plan

SOURCE: Van Angeren, P. 2014. Geological Assessment and Exploration Proposal for the Empire Mine Project. Prepared for Boxxer Gold Corporation. Figure 3.

PROJECT NUMBER: 2017220015	Baseline Biological Survey Report Portions of Sec 1&2, T6N R23E; Sec 35&36, T7N R23E Boise Meridian
DATE: 9/12/2017	
DWG NO: 2017220015 FIGURE 2.DWG	Konnex Resources Inc. Mackay, Idaho
DWG BY: 6DJR / PROJECT MANAGER: 5DJB	
REVISED:	CASCADE EARTH SCIENCES

2017220015 Figure 2.dwg September 12, 2017 BD701479



Legend

500-foot Buffer
Claim Block Boundary

Slope, percent

0 - 15
15 - 30
30 - 45

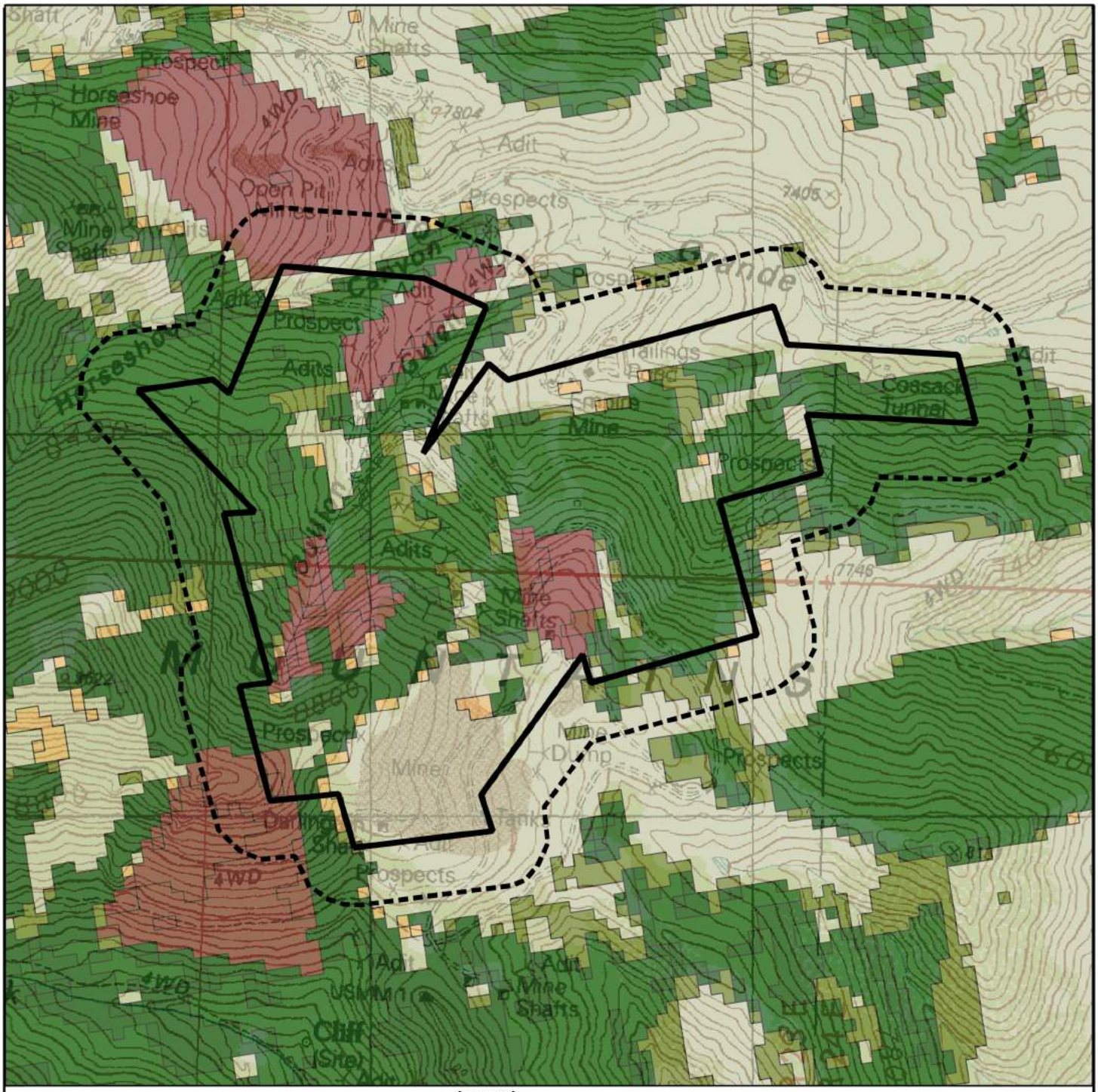
N

0 1000 2000 feet

Figure 3. Slope Gradient Map

PROJECT NUMBER: 2017220015	**Baseline Biological Survey Report**
DATE: 9/8/2017	Portions of Sec 1&2, T6N, R23E; Sec 35&36, T7N, R23E Boise Meridian
FILE: 2017220015 202 F2.qgs	**Konnex Resources Inc**
PREP BY: DJB / REVIEWED BY:	**Mackay, Idaho**
REVISIONS:	CASCADE EARTH SCIENCES A Valmont Industries Company

Projection:
Sources: June 2017 Vegetation Polygons by CES/Ballard Botanical Consulting; USGS 1991 Mackay Reservoir 7.5 Minute Quadrangle; USGS GAP Land Cover Maps (accessed June 1, 2017).



Legend

500-foot Buffer
Claim Block Boundary

USGS GAP Vegetation Communities

- Harvested Forest - Grass/Forb Regeneration
- Harvested Forest - Northwestern Conifer Regeneration
- Harvested Forest - Shrub Regeneration
- Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland
- Inter-Mountain Basins Curl-leaf Mountain Mahogany Woodland and Shrubland
- Inter-Mountain Basins Montane Sagebrush Steppe
- Middle Rocky Mountain Montane Douglas-fir Forest and Woodland
- Northern Rocky Mountain Lower Montane, Foothill and Valley Grassland
- Northern Rocky Mountain Subalpine Deciduous Shrubland
- Northern Rocky Mountain Subalpine-Upper Montane Grassland
- Rocky Mountain Aspen Forest and Woodland
- Rocky Mountain Lodgepole Pine Forest
- Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland
- Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland
- Rocky Mountain Subalpine-Montane Limber-Bristlecone Pine Woodland
- Rocky Mountain Subalpine-Montane Mesic Meadow

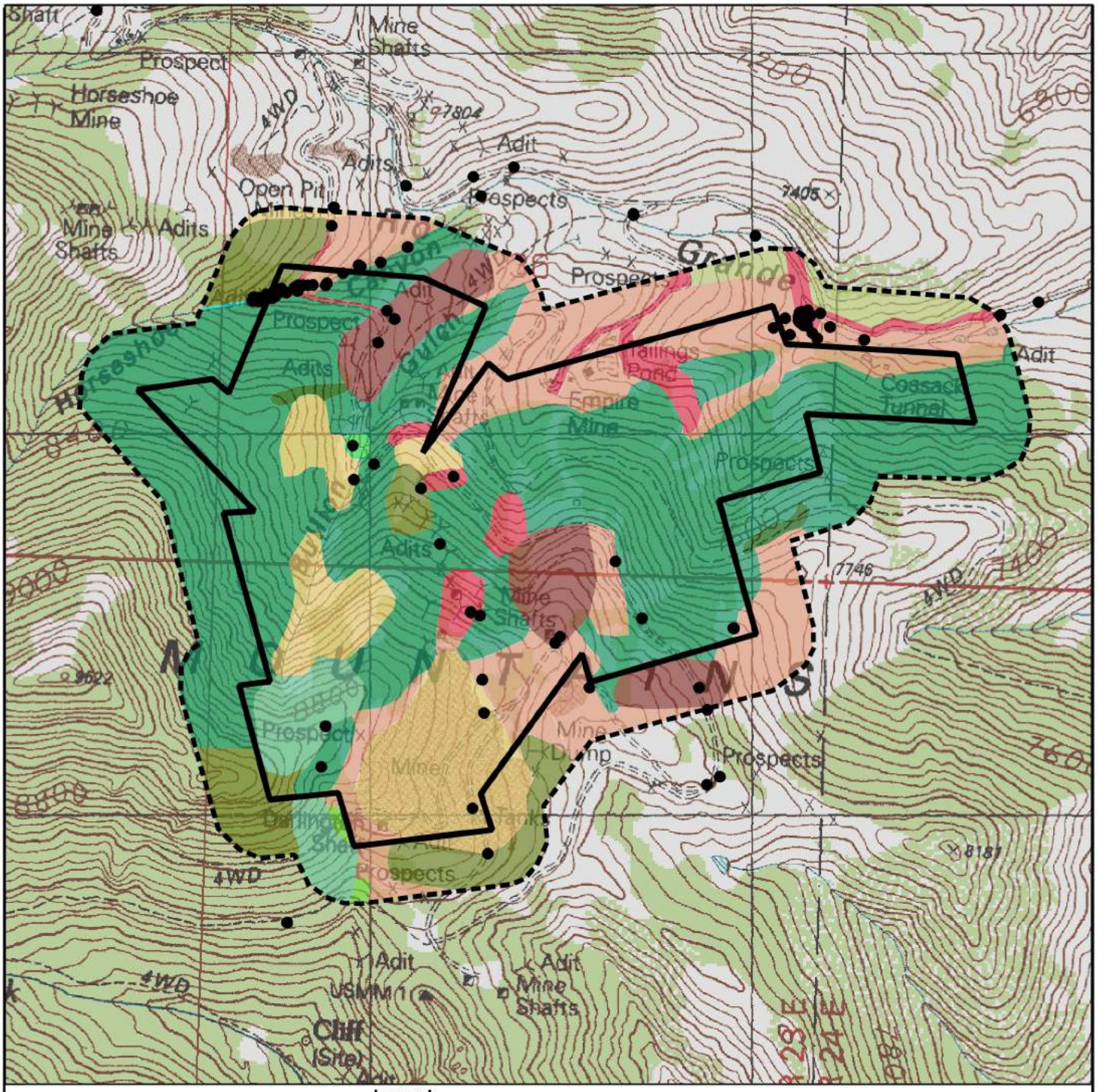
N

Figure 4. USGS GAP Vegetation Community Map

0 1000 2000 feet

Projection:
Sources: USGS 1991 Mackay Reservoir 7.5 Minute Quadrangle; USGS GAP Land Cover Maps (accessed June 1, 2017).

PROJECT NUMBER: 2017220015	**Baseline Biological Survey Report**
DATE: 8/9/2017	Portions of Sec 1&2. T6N. R23E: Sec 35&36. T7N. R23E Boise Meridian
FILE: 2017220015 202 F2.qgs	**Konnex Resources Inc**
PREP BY: DJB / REVIEWED BY:	**Mackay, Idaho**
REVISIONS:	CASCADE EARTH SCIENCES A Valmont Industries Company



Legend

- 500-foot Buffer
- Claim Block Boundary
- Curl-leaf Mountain-mahogany / Idaho Fescue Woodland
- Disturbed
- Douglas-fir / Mountain Snowberry Forest
- Harvested Forest - Northwestern Conifer Regeneration
- Harvested Forest - Shrub Regeneration
- Horseshoe Canyon Riparian Woodland and Shrubland
- Intermontain Basins Low Sagebrush Shrubland
- Intermountain Basins Juniper Savanna
- Limber Pine / Antelope Bitterbrush Woodland
- Quaking Aspen Woodland
- Recently Mined or Quarried
- Subalpine Fir - Engelmann Spruce / Common Juniper Woodland

N

0 1000 2000 feet

Figure 5. Project Vegetation Community Map

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DATE: 8/9/2017	Portions of Sec 1&2. T6N. R23E: Sec 35&36. T7N. R23E Boise Meridian
FILE: 2017220015 202 F2.qgs	**Konnex Resources Inc**
PREP BY: DJB / REVIEWED BY:	**Mackay, Idaho**
REVISIONS:	CASCADE EARTH SCIENCES A Valmont Industries Company

Projection:
Sources: June 2017 Vegetation Polygons by CES/Ballard Botanical Consulting; USGS 1991 Mackay Reservoir 7.5 Minute Quadrangle; USGS GAP Land Cover Maps (accessed June 1, 2017).

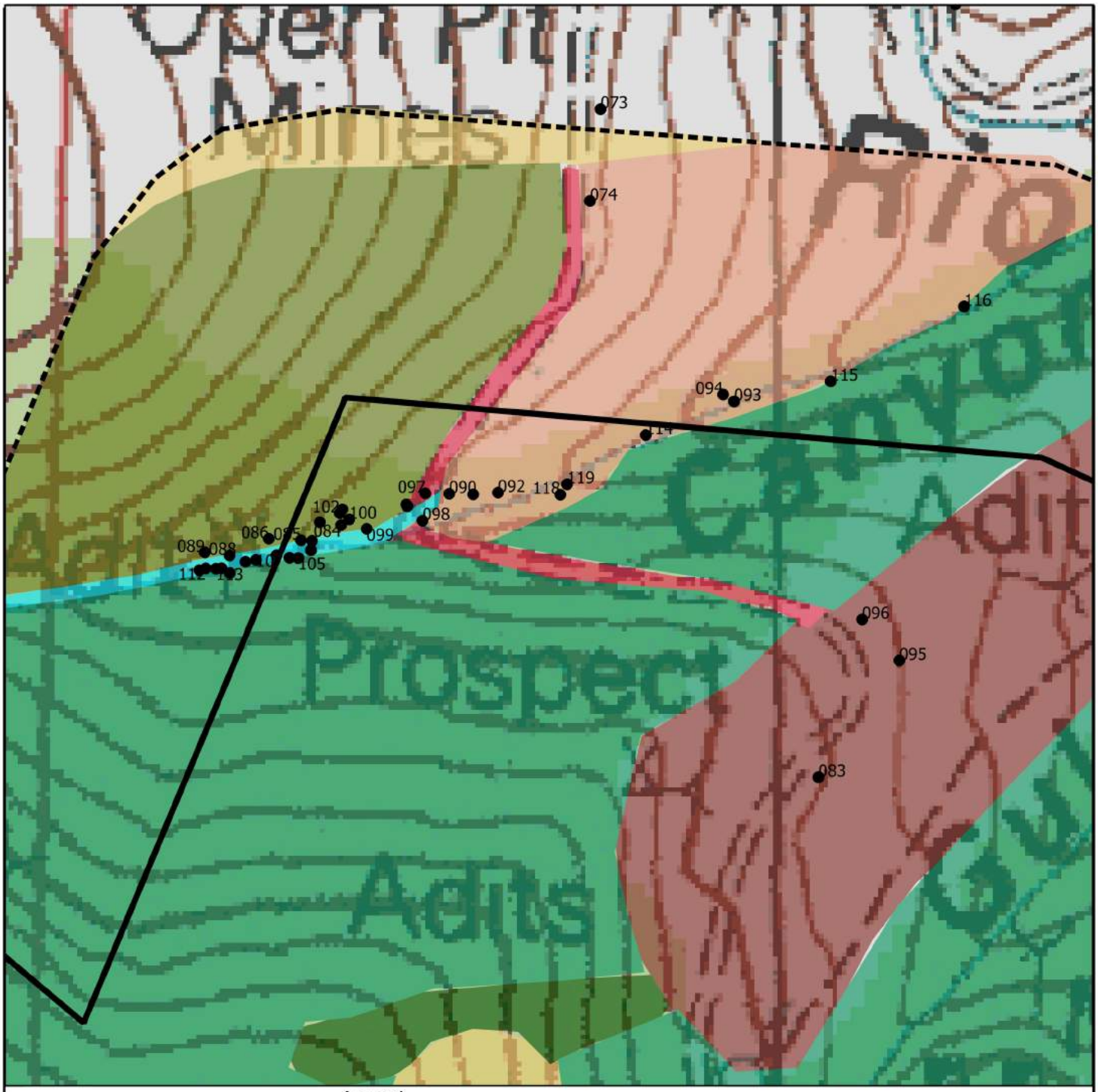

Figure 6. Wetland Delineation Map

Projection:
Sources: June 2017 Vegetation Polygons by CES/Ballard Botanical Consulting; USGS 1991 Mackay Reservoir 7.5 Minute Quadrangle; USGS GAP Land Cover Maps (accessed June 1, 2017).

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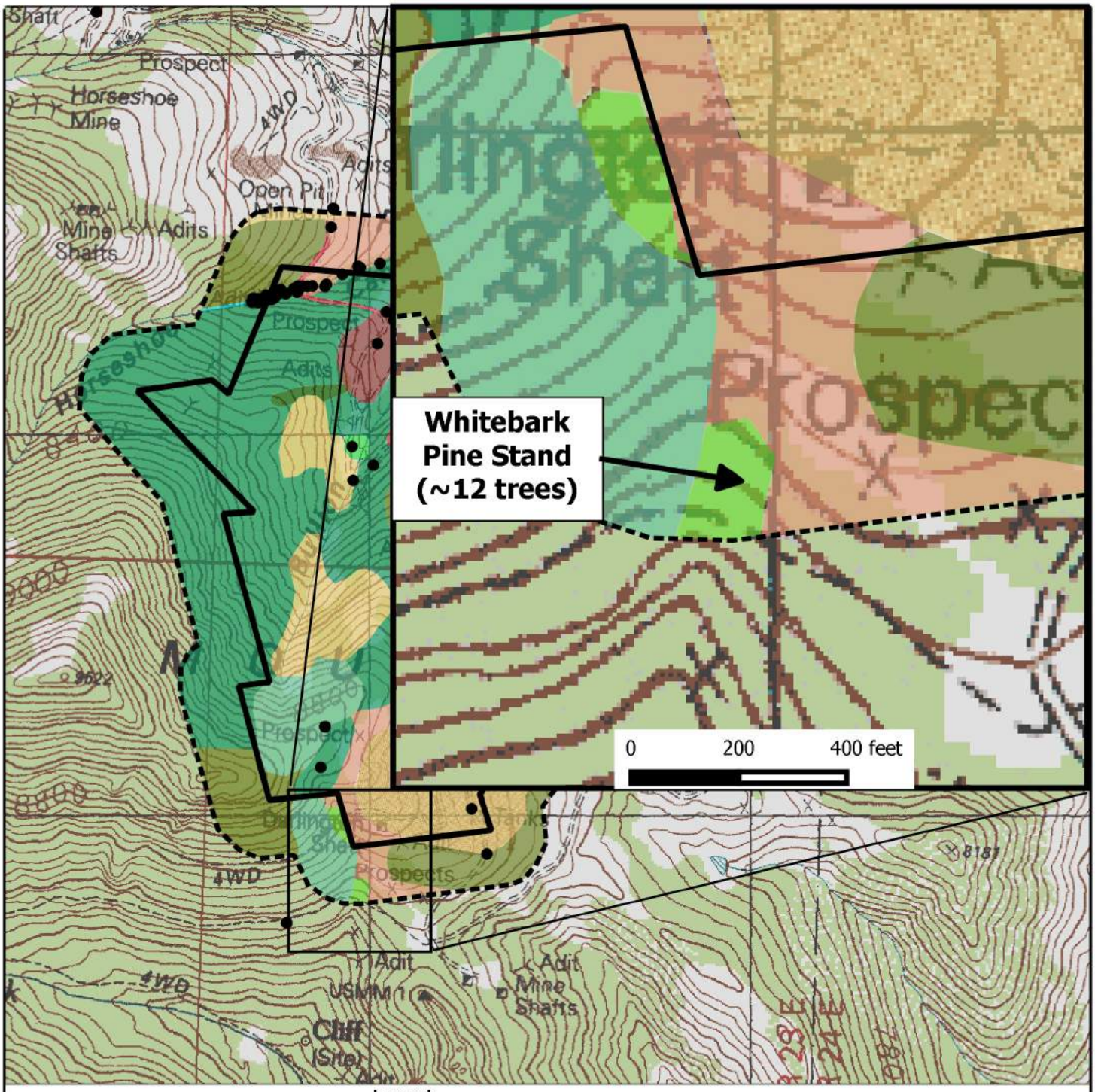
FILE: 2017220015 202 F2.qgs	**Konnex Resources Inc**
PREP BY: DJB / REVIEWED BY:	**Mackay, Idaho**
REVISIONS:	CASCADE EARTH SCIENCES A Valmont Industries Company



Legend

- 500-foot Buffer
- Claim Block Boundary
- Curl-leaf Mountain-mahogany / Idaho Fescue Woodland
- Disturbed
- Douglas-fir / Mountain Snowberry Forest
- Harvested Forest - Northwestern Conifer Regeneration
- Harvested Forest - Shrub Regeneration
- Horseshoe Canyon Riparian Woodland and Shrubland
- Intermontain Basins Low Sagebrush Shrubland
- Intermountain Basins Juniper Savanna
- Limber Pine / Antelope Bitterbrush Woodland
- Quaking Aspen Woodland
- Recently Mined or Quarried
- Subalpine Fir - Engelmann Spruce / Common Juniper Woodland

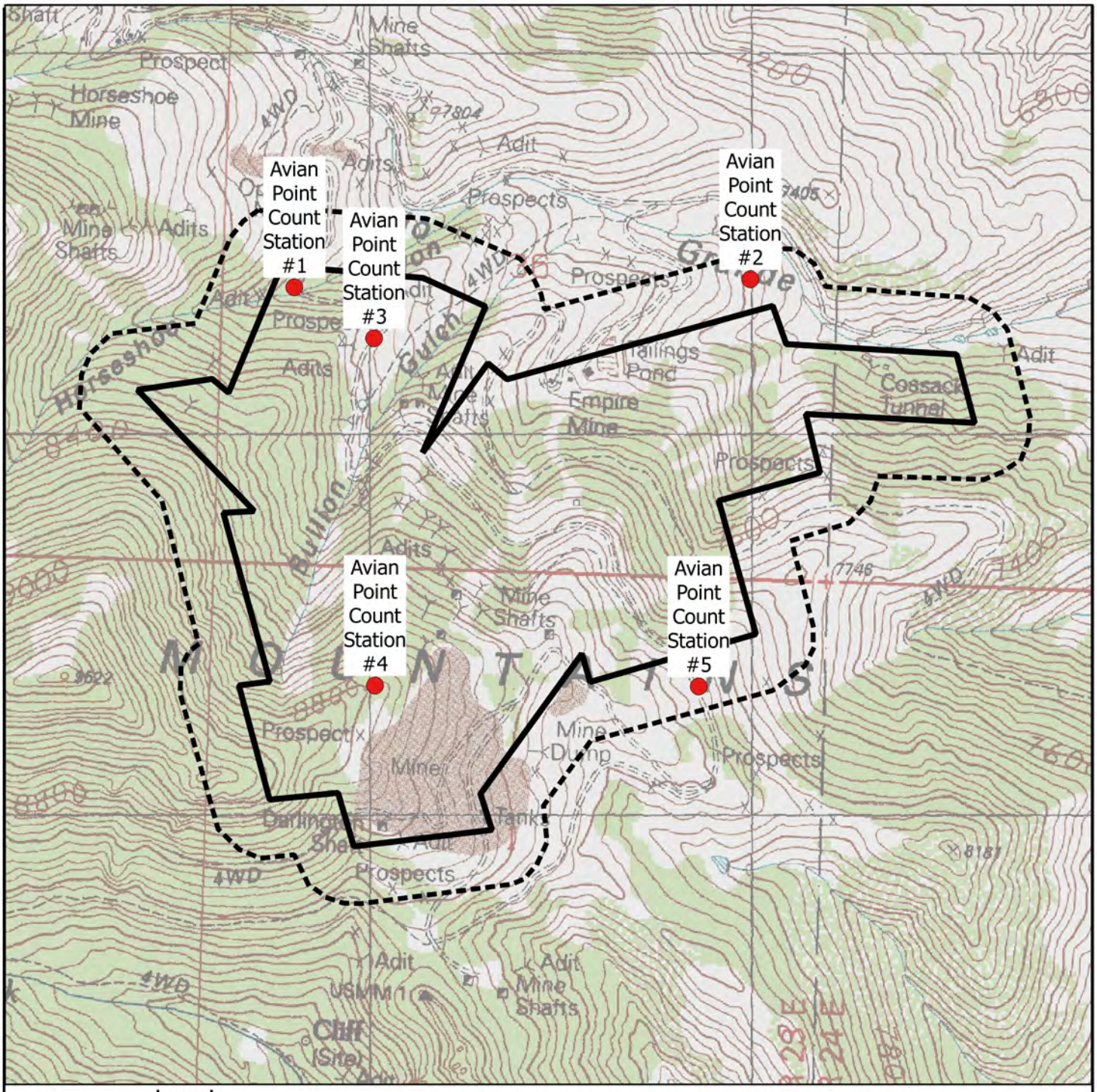
N

0 1000 2000 feet

Figure 7. Whitebark Pine Stand Map

Projection:
Sources: June 2017 Vegetation Polygons by CES/Ballard Botanical Consulting; USGS 1991 Mackay Reservoir 7.5 Minute Quadrangle; USGS GAP Land Cover Maps (accessed June 1, 2017).

PROJECT NUMBER: 2017220015	**Baseline Biological Survey Report**
DATE: 8/9/2017	Portions of Sec 1&2. T6N. R23E: Sec 35&36. T7N. R23E Boise Meridian
FILE: 2017220015 202 F2.qgs	**Konnex Resources Inc**
PREP BY: DJB / REVIEWED BY:	**Mackay, Idaho**
REVISIONS:	CASCADE EARTH SCIENCES A Valmont Industries Company



Legend

- 500-foot Buffer
- Claim Block Boundary
- Avian Point Count Stations - June 2017

N

0 1000 2000 feet

Figure 8. Avian Point Count Station Map

Projection:
Sources: June 2017 Vegetation Polygons by CES/Ballard Botanical Consulting; USGS 1991 Mackay Reservoir 7.5 Minute Quadrangle; USGS GAP Land Cover Maps (accessed June 1, 2017).

PROJECT NUMBER: 2017220015	**Baseline Biological Survey Report**
DATE: 8/9/2017	Portions of Sec 1&2. T6N. R23E: Sec 35&36. T7N. R23E Boise Meridian
FILE: 2017220015 202 F2.qgs	**Konnex Resources Inc**
PREP BY: DJB / REVIEWED BY:	**Mackay, Idaho**
REVISIONS:	CASCADE EARTH SCIENCES A Valmont Industries Company

APPENDICES

Appendix A. Agency Correspondence
Appendix B. Survey Photographs
Appendix C. NRCS Custom Soil Survey Report for Custer County, Idaho
Appendix D. Special Status Plant Species with Potential Habitat in the Project Area
Appendix E. Wetland Delineation Data Forms, Site Illustrations, and Photos
Appendix F. Sensitive Wildlife Species List Pre-Survey, June 2017
Appendix G. Avian Point Count Survey Datasheets

Appendix A.

Agency Correspondence

Agency Personnel contacted regarding rare and sensitive vegetation and wildlife species
June 6-7-8, 2017

Joni D. Cain
Realty Specialist
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721 East Main Ave, Challis ID 83226
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Mark D. Howell, Wildlife Biologist
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Jim Strickland
Botany Data Coordinator, Idaho Department of Fish and Game
Idaho Fish and Wildlife Information System
Idaho Natural Heritage Program
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Lehman, Rose M -FS <rlehman@fs.fed.us

Robert A. Brochu
Senior Regulatory Project Manager
Walla Walla District
Idaho Falls Office
208-522-1645
208-522-2994 (fax)
Robert.A.Brochu@usace.army.mil

Kevin Lloyd is the contact for sensitive plants. His email is klloyd@blm.gov and his phone number is 208-879-6209

Andrew Hess – BLM – provided a list of soils within Empire Mine area – all are mollisols:

- JIMBEE-ROCK OUTCROP-IKE ASSOCIATION, 30 TO 75 PERCENT SLOPES
- IKE-ROCK OUTCROP-JIMBEE COMPLEX, 15 TO 60 PERCENT SLOPES
- GANY GRAVELLY LOAM, 30 TO 60 PERCENT SLOPES
- INFERNO-GROUSEVILLE ASSOCIATION, 15 TO 50 PERCENT SLOPES

ZEALE-MEEGERO COMPLEX, 20 TO 40 PERCENT SLOPES

Appendix B.

Survey Photographs

Photograph 1.

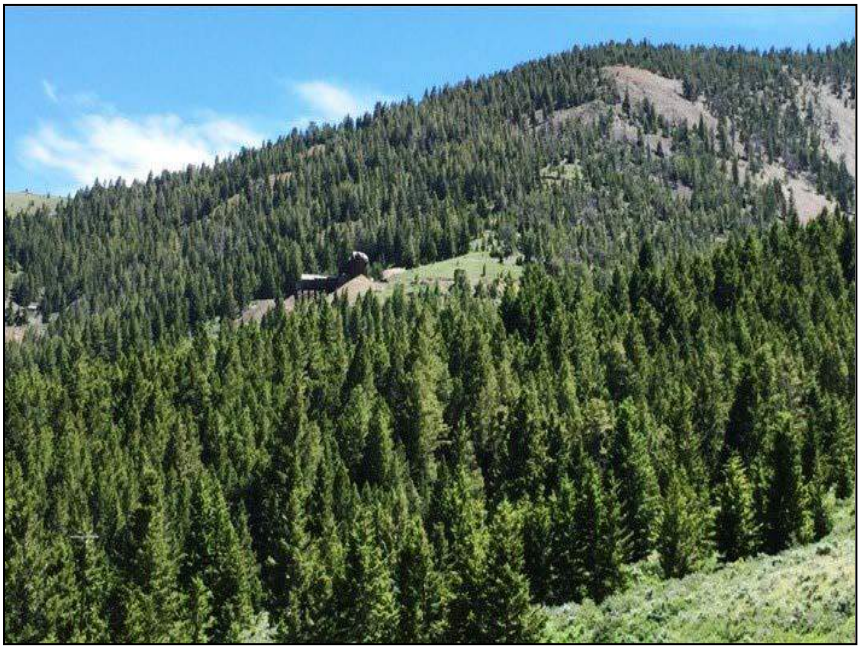
Man-made structures often indicate nearby adits and past mining disturbance throughout the Project Area.

Photograph 2.

Rocky outcrops occur more frequently as the elevation increases in the Project Area.

Photograph 3.

Communities of low sagebrush and snowberry occur on drier slopes with shallower soils than those of Douglas fir.



Photograph 4.

Looking southeast, grey, barren talus slopes on north-facing slopes contrast with Douglas-fir conifer stands.

Photograph 5.

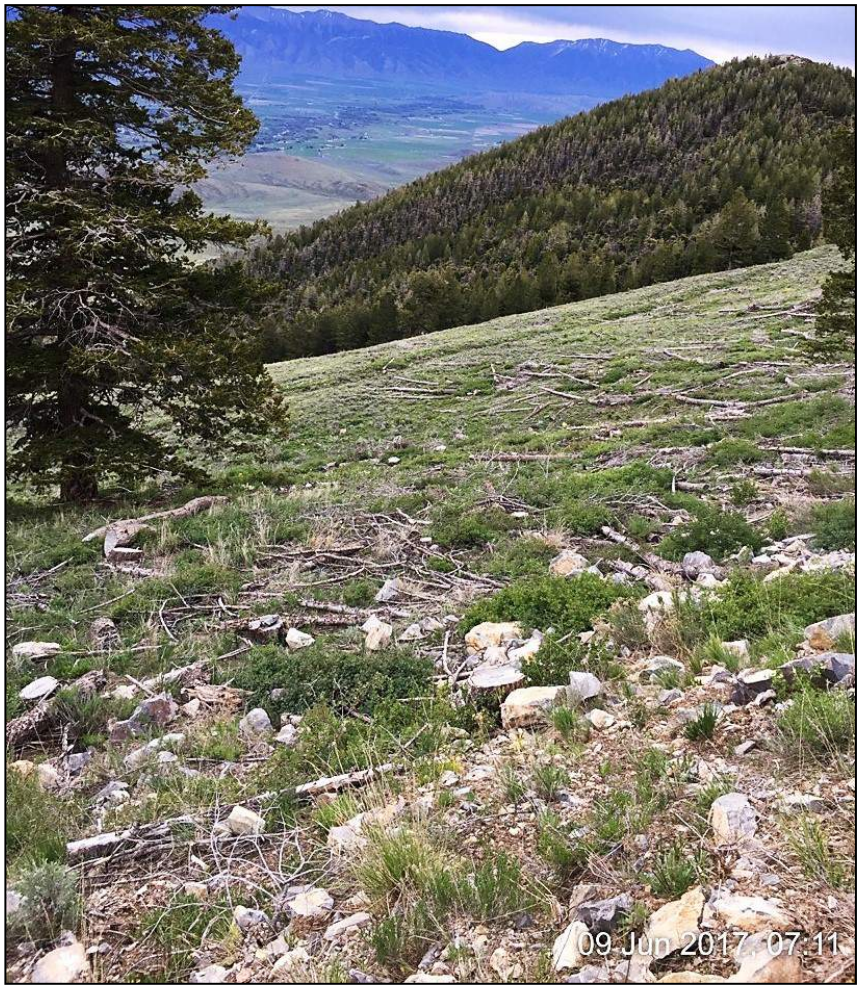
Looking northwest from high elevations near open pit mine, showing Douglas fir stringers alternating with low sagebrush plant communities on south-facing slopes.

Photograph 6.

Grasslands are also an important plant community. Here, Columbia Needlegrass colonizes rocky, shallow soil where several wildflower species also occur interspersed between the grasses.

Photograph 7.

Rocky, shallow soils with grasses dominating understory, over-looking Douglas fir stands.



Photograph 8.

Looking eastward, patchy forbs and graminoids colonizing past clear-cut site.

Photograph 9.

Steep slopes characterize much of the Project Area. New snowberry shrubs are growing in between grasses and wildflowers in a past clear-cut area.

Photograph 10.

Whitebark pine (Pinus albicaulis), a federal Candidate species for protection, grows only at the highest elevations within the Project Area, up above where any drilling or exploration will take place.

Appendix C.

NRCS Custom Soil Survey Report for Custer County, Idaho

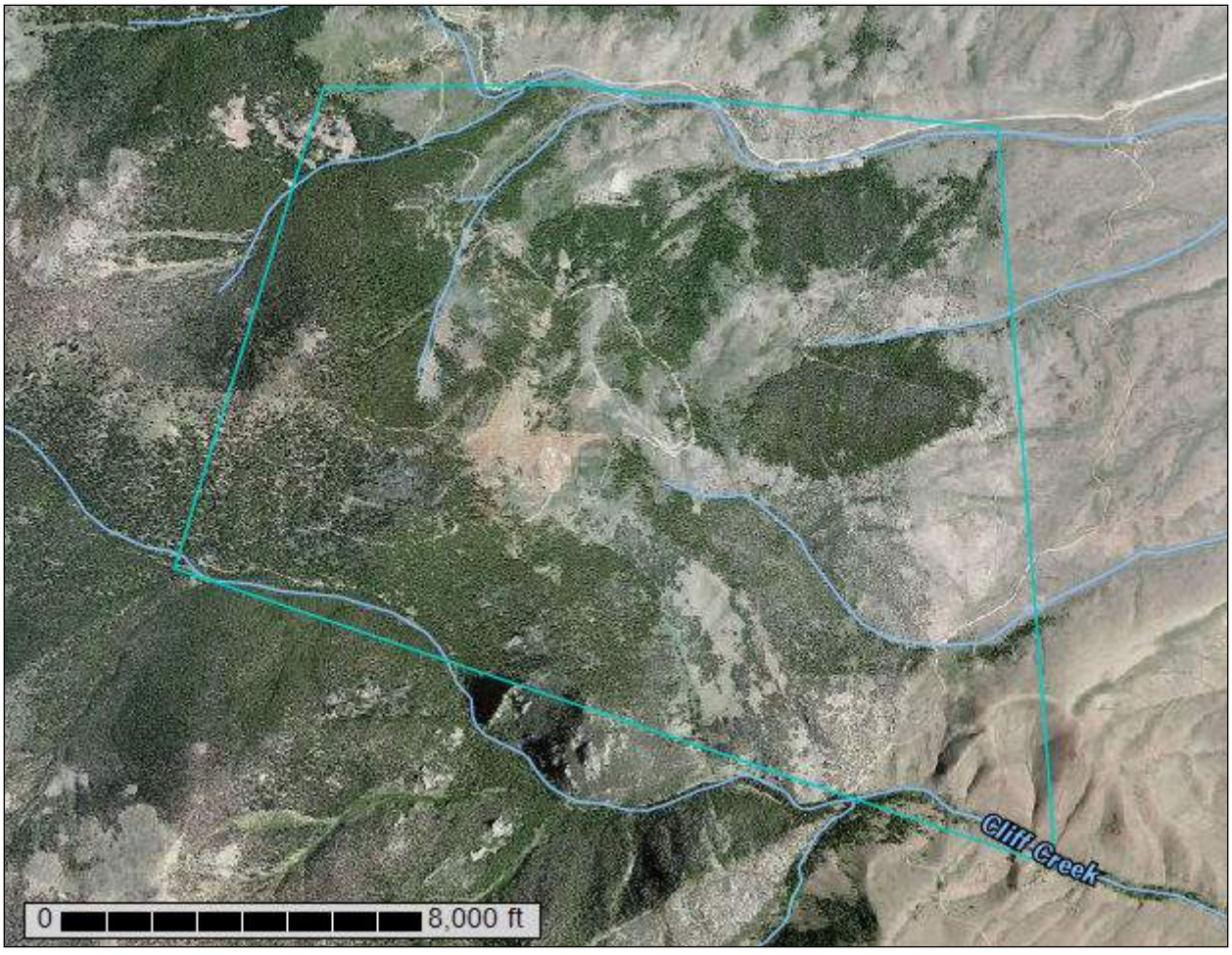
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Challis National Forest, Eastern Part, Idaho; and Custer-Lemhi Area, Idaho, Parts of Blaine, Custer, and Lemhi Counties



April 25, 2017

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

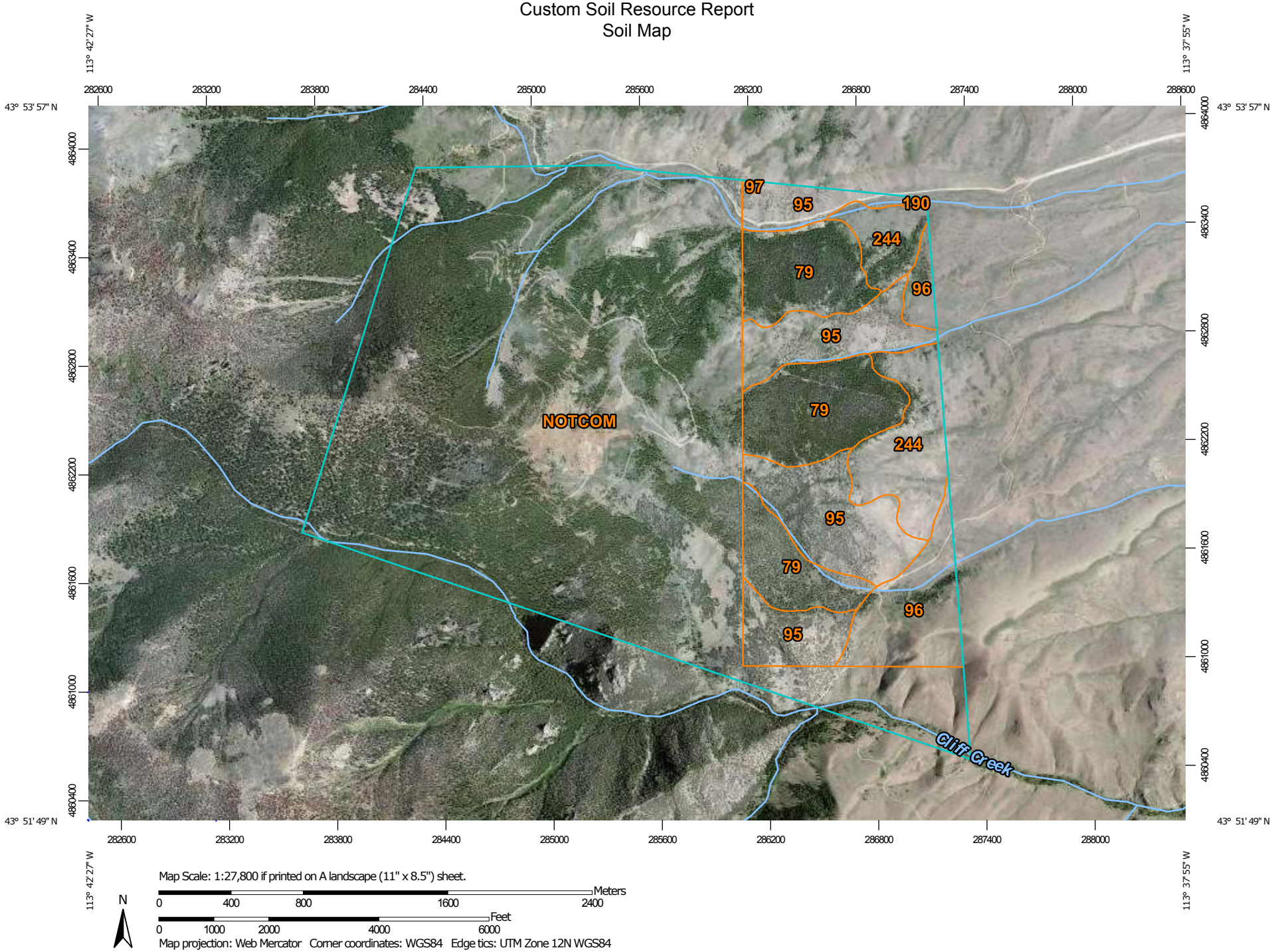
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Challis National Forest, Eastern Part, Idaho
Survey Area Data: Version 2, Dec 9, 2013

Soil Survey Area: Custer-Lemhi Area, Idaho, Parts of Blaine, Custer, and Lemhi Counties
Survey Area Data: Version 16, Sep 9, 2015

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 16, 2010—Sep 24, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Challis National Forest, Eastern Part, Idaho (ID703)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
NOTCOM	No Digital Data Available	1,401.6	65.7%
Subtotals for Soil Survey Area		**1,401.6**	**65.7%**
Totals for Area of Interest		**2,134.0**	**100.0%**

Custer-Lemhi Area, Idaho, Parts of Blaine, Custer, and Lemhi Counties (ID752)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
79	Gany gravelly loam, 30 to 60 percent slopes	243.5	11.4%
95	Ike-Rock outcrop-Jimbee complex, 15 to 60 percent slopes	254.4	11.9%
96	Inferno-Grouseville association, 15 to 50 percent slopes	104.4	4.9%
97	Jimbee-Rock outcrop-Ike association, 30 to 75 percent slopes	0.7	0.0%
190	Simeroi gravelly loam, 6 to 15 percent slopes	1.2	0.1%
244	Zeale-Meegero complex, 20 to 40 percent slopes	128.0	6.0%
Subtotals for Soil Survey Area		**732.4**	**34.3%**
Totals for Area of Interest		**2,134.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called

noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can

be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Challis National Forest, Eastern Part, Idaho

NOTCOM—No Digital Data Available

Map Unit Composition

Notcom: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Notcom

Properties and qualities

Custer-Lemhi Area, Idaho, Parts of Blaine, Custer, and Lemhi Counties

79—Gany gravelly loam, 30 to 60 percent slopes

Map Unit Setting

National map unit symbol: 2sm5
Elevation: 6,500 to 9,000 feet
Mean annual precipitation: 23 to 28 inches
Mean annual air temperature: 34 to 37 degrees F
Frost-free period: 10 to 40 days
Farmland classification: Not prime farmland

Map Unit Composition

Gany and similar soils: 80 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gany

Setting

Landform: Mountain slopes
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess and/or alluvium and/or colluvium derived from limestone

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 7 inches: gravelly loam
Bk - 7 to 22 inches: very gravelly loam
Bkq - 22 to 61 inches: extremely cobbly sandy loam

Properties and qualities

Slope: 30 to 60 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Other vegetative classification: Douglas-fir/mountain snowberry (CDS626)
Hydric soil rating: No

95—Ike-Rock outcrop-Jimbee complex, 15 to 60 percent slopes

Map Unit Setting

National map unit symbol: 2smr
Elevation: 5,000 to 8,500 feet
Mean annual precipitation: 8 to 13 inches
Mean annual air temperature: 36 to 45 degrees F
Frost-free period: 50 to 70 days
Farmland classification: Not prime farmland

Map Unit Composition

Ike, very stony surface, and similar soils: 45 percent
Rock outcrop: 20 percent
Jimbee and similar soils: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ike, Very Stony Surface

Setting

Landform: Mountain slopes
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Colluvium over bedrock derived from limestone

Typical profile

A - 0 to 3 inches: stony loam
Bkq1 - 3 to 12 inches: very gravelly loam
Bkq2 - 12 to 17 inches: extremely stony loam
R - 17 to 27 inches: bedrock

Properties and qualities

Slope: 15 to 60 percent
Percent of area covered with surface fragments: 1.5 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 60 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: LIMEY GRAVELLY 8-13 ARNO4/PSSPS (R012XY001ID)

Hydric soil rating: No

Description of Rock Outcrop

Typical profile

R - 0 to 60 inches: bedrock

Properties and qualities

Slope: 15 to 60 percent
Depth to restrictive feature: 0 inches to lithic bedrock

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: Unranked

Description of Jimbee

Setting

Landform: Mountain slopes
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Colluvium and/or slope alluvium over bedrock derived from limestone

Typical profile

A - 0 to 6 inches: gravelly loam
Bkq - 6 to 16 inches: very gravelly loam
R - 16 to 26 inches: bedrock

Properties and qualities

Slope: 15 to 60 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 55 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: SHALLOW GRAVELLY LOAM 11-13 ARAR8/PSSPS-FEID (R012XY002ID)
Hydric soil rating: No

96—Inferno-Grouseville association, 15 to 50 percent slopes

Map Unit Setting

National map unit symbol: 2sms
Elevation: 6,000 to 9,000 feet
Mean annual precipitation: 13 to 20 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 30 to 100 days
Farmland classification: Not prime farmland

Map Unit Composition

Inferno and similar soils: 45 percent
Grouseville and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Inferno

Setting

Landform: Ridges, mountain slopes
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Alluvium and/or colluvium derived from volcanic rock

Typical profile

A1 - 0 to 7 inches: gravelly clay loam
A2 - 7 to 12 inches: gravelly clay loam
Bt - 12 to 36 inches: gravelly clay
Btk1 - 36 to 54 inches: gravelly clay
Btk2 - 54 to 60 inches: extremely gravelly clay

Properties and qualities

Slope: 15 to 35 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Moderate (about 7.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C

Ecological site: CLAYEY SOUTH SLOPE 12-16 ARAR8/PSSPS (R012XY029ID)
Hydric soil rating: No

Description of Grouseville

Setting
Landform: Ridges, mountain slopes
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Alluvium and/or colluvium derived from volcanic rock and/or tuff and/or andesite

Typical profile
A - 0 to 7 inches: silt loam
Bt - 7 to 18 inches: clay loam
Btk - 18 to 60 inches: clay

Properties and qualities
Slope: 20 to 50 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 11.8 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: LOAMY 16-22 ARTRV/FEID (R012XY021ID)
Hydric soil rating: No

97—Jimbee-Rock outcrop-Ike association, 30 to 75 percent slopes

Map Unit Setting
National map unit symbol: 2smt
Elevation: 5,000 to 8,500 feet
Mean annual precipitation: 8 to 13 inches
Mean annual air temperature: 36 to 45 degrees F
Frost-free period: 10 to 70 days
Farmland classification: Not prime farmland

Map Unit Composition
Jimbee and similar soils: 45 percent
Rock outcrop: 20 percent

Ike, very stony surface, and similar soils: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Jimbee

Setting

Landform: Mountain slopes
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Colluvium and/or slope alluvium over bedrock derived from limestone

Typical profile

A - 0 to 6 inches: gravelly loam
Bkq - 6 to 16 inches: very gravelly loam
R - 16 to 26 inches: bedrock

Properties and qualities

Slope: 30 to 75 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 55 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: SHALLOW GRAVELLY LOAM 11-13 ARAR8/PSSPS-FEID (R012XY002ID)
Hydric soil rating: No

Description of Rock Outcrop

Typical profile

R - 0 to 60 inches: bedrock

Properties and qualities

Slope: 30 to 75 percent
Depth to restrictive feature: 0 inches to lithic bedrock

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: Unranked

Description of Ike, Very Stony Surface

Setting

Landform: Mountain slopes

Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Colluvium over bedrock derived from limestone

Typical profile

A - 0 to 3 inches: stony loam
Bkq1 - 3 to 12 inches: very gravelly loam
Bkq2 - 12 to 17 inches: extremely gravelly sandy loam
R - 17 to 27 inches: bedrock

Properties and qualities

Slope: 30 to 75 percent
Percent of area covered with surface fragments: 1.5 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 60 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Ecological site: LIMEY GRAVELLY 8-13 ARNO4/PSSPS (R012XY001ID)
Hydric soil rating: No

190—Simeroi gravelly loam, 6 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2sfz
Elevation: 4,500 to 7,100 feet
Mean annual precipitation: 8 to 11 inches
Mean annual air temperature: 37 to 45 degrees F
Frost-free period: 60 to 100 days
Farmland classification: Farmland of statewide importance, if irrigated

Map Unit Composition

Simeroi and similar soils: 95 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Simeroi

Setting

Landform: Fan remnants, outwash fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from limestone

Typical profile

A - 0 to 3 inches: gravelly loam
Bk - 3 to 8 inches: extremely gravelly loam
Bkq1 - 8 to 48 inches: very gravelly sandy loam
2Bkq2 - 48 to 60 inches: very gravelly loamy coarse sand

Properties and qualities

Slope: 6 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 70 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6c
Hydrologic Soil Group: B
Ecological site: GRAVELLY LOAM 8-12 ARTRW8/PSSPS (R012XY004ID)
Hydric soil rating: No

244—Zeale-Meegero complex, 20 to 40 percent slopes

Map Unit Setting

National map unit symbol: 2shx
Elevation: 6,000 to 9,000 feet
Mean annual precipitation: 12 to 19 inches
Mean annual air temperature: 34 to 43 degrees F
Frost-free period: 30 to 60 days
Farmland classification: Not prime farmland

Map Unit Composition

Zeale and similar soils: 55 percent
Meegero and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Zeale

Setting

Landform: Mountain slopes
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Alluvium and/or colluvium and/or slope alluvium derived from limestone

Typical profile

A - 0 to 9 inches: gravelly loam
Bk - 9 to 60 inches: very gravelly loam

Properties and qualities

Slope: 20 to 40 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 80 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: SHALLOW GRAVELLY LOAM 11-13 ARAR8/PSSPS-FEID (R012XY002ID)
Hydric soil rating: No

Description of Meegero

Setting

Landform: Mountain slopes
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Colluvium derived from limestone and/or shale

Typical profile

A - 0 to 10 inches: loam
Bk1 - 10 to 19 inches: gravelly loam
Bk2 - 19 to 29 inches: very gravelly loam
Bk3 - 29 to 60 inches: extremely cobbly loam

Properties and qualities

Slope: 20 to 40 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 2.00 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 60 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: LOAMY 16-22 ARTRV/FEID (R012XY021ID)
Hydric soil rating: No

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Appendix D.

Special Status Plant Species with Potential Habitat in the Project Area

Appendix D. Special Status Plant Species with Potential Habitat in the Project Area

Scientific Name	Common Name	Known Habitat	Global and State Status	Potential to Occur in Study Area
US FWS Candidate Plant Species				
Pinus albicaulis	Whitebark Pine	Occurs on upper subalpine forests only, weakly developed (immature) soils, growing on steep slopes and windy exposures in subalpine and alpine **habitats**. It is often an early to mid-seral species. It grows with other cold and wind tolerant alpine trees such as lodgepole **pine** (P. contorta), Englemann spruce (Picea engelmannii), and subalpine fir (Abies lasiocarpa).	G3 - Vulnerable	Likely
Forest Service Sensitive Plant Species				
Lewisia sacajaweana	Sacajawea's bitter-root	Montane and subalpine habitats ranging from 5,000 to 9,500 feet. The plant is dormant most of the year, like its relative, the common bitterroot, *Lewisia rediviva* (Montana's state flower). Shortly after snowmelt, a rosette of succulent leaves emerges, followed by showy white flowers that hug the ground	G2, S1 – Imperiled Also - BLM Sensitive Species – Type 4	Unlikely
Primula incalina	Bluedome primrose	Occurs in wet, alkaline meadows, at the headwaters of spring-fed creeks in the large, intermontane valleys of east-central Idaho. Soils in the meadows are alluvial, alkaline, fine-textured, light-colored, and derived from outwash from the predominantly carbonate rocks of the Beaverhead, Lemhi, and Lost River ranges.	G2, N2	Unlikely
Draba trichocarpa	Stanley whitlow-grass	12 small occurrences in the Sawtooth Valley, near Stanley, in central Idaho.	NNR	Unlikely

Scientific Name	Common Name	Known Habitat	Global and State Status	Potential to Occur in Study Area
Astagalus diversifolius	Mesic milkvetch	Apparently quite rare. Currently known only from southeastern Idaho (valleys of the Lost and Lemhi Rivers, and upper Snake River Plains), Great Divide Basin, Wyoming. Threatened by habitat loss to agriculture and livestock. grazing.	G2 - Imperiled N2. The Idaho Conservation Status Rank has increased from S2 (imperiled) to S1 (critically imperiled) so it is possible that it is declining in this state.	Possible (known occurrence 20 miles away from Project Area
Forest Service Watch Plant Species				
Eriogonum meledonum	Guardian buckwheat	Endemic to a section of the Sawtooth Valley, centered around Stanley Idaho.	G2, N2	Unlikely
BLM Sensitive Species				
Eriogonum crosbyae aka E. capistratum var. welshii	Crosby's wild buckwheat	Mountain ranges of central Idaho (Blaine, Butte, Camas, Custer, and Lemhi counties) and in western Montana (Deer Lodge and Ravalli counties	G4T2Q, S2, as a BLM Sensitive Type 3 species	Likely

Appendix E.

Wetland Delineation Data Forms, Site Illustrations, and Photos

WETLAND DETERMINATION DATA FORM - Arid West Region

Project/Site: Horsehoe Canyon | City/County: Custer | Sampling Date: June 22, 2017
Applicant/Owner: Konnex | State: ID | Sampling Point: 4
Investigator(s): Leanna Ballard + KeriAnne Pritchett | Section, Township, Range: T 7 N, T 6 N, R 23 E and R 24 E
Landform (hillslope, terrace, etc.): hillslope | Local relief (concave, convex, none): | Slope (%):
Subregion (LRR): B - Columbia/Snake River Plateau | Lat: 284875, 4863391 | Long: 4863391 (Avenza #9) | Datum: NAD 1983
Soil Map Unit Name: Not mapped - dark mollisol | NWI classification:
Are climatic / hydrologic conditions on the site typical for this time of year? Yes (•) No ( ) (If no, explain in Remarks.)
Are Vegetation [ ] Soil [ ] or Hydrology [ ] significantly disturbed? Are "Normal Circumstances" present? Yes (•) No ( )
Are Vegetation [ ] Soil [ ] or Hydrology [ ] naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes (•) No ( )
Hydric Soil Present? Yes (•) No ( )
Wetland Hydrology Present? Yes (•) No ( )
Is the Sampled Area within a Wetland? Yes ( ) No (•)

Remarks: Wetland species are dropping out here - now willows present at this Sample Site #4. Placemark #9 in Avenza maps

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	%		
Sapling/Shrub Stratum			
1. *Ribes lacustre*	12	No	FACW
2. *Ribes laxiflorum*	15	Yes	FACU
3. *Ribes viscossissimum*	10	No	FAC
4. *Prunus virginiana*	15	Yes	FAC
5.			
Total Cover:	52 %		
Herb Stratum			
1. *Saxifraga odontoloma - SAOD2*	3	No	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Total Cover:	3 %		
Woody Vine Stratum			
1.			
2.			
Total Cover:	%		

% Bare Ground in Herb Stratum % | % Cover of Biotic Crust %

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0 % (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	0
FACW species	15	x 2 =	30
FAC species	10	x 3 =	30
FACU species	15	x 4 =	60
UPL species		x 5 =	0
Column Totals:	40 (A)		120 (B)

Prevalence Index = B/A = 3.00

Hydrophytic Vegetation Indicators:
[•] Dominance Test is >50%
[X] Prevalence Index is ≤3.0[1]
[ ] Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
[ ] Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes (•) No ( )

Remarks:

Sampling Point: 4

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 2/1	100					mucky peat	
2-8	10YR 2/2	100					silt loam	see sand grains - maybe 5% organic matter
8-14	10YR 2/2	100					silt loam	20% gravel- mostly fine (95%) some medium (5%), maybe slightly more OM than above at 6% Estimate 17% clay

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes X No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes X No ____ Depth (inches): _____

Water Table Present? Yes X No ____ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ____ No ____ Depth (inches): _____

Wetland Hydrology Present? Yes X No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Brook saxifrage – Sample Site #3

Sample Site #3 is at the highest elevation of the wetland delineation (7820 feet) and mosses grow on the rocks and boulders inside the channel. Baneberry and chokecherry are associated shrubs.

Red elderberry – Sample Site #2

Sample Site #2 is near SS #1 but has more Dogwood and Elderberry shrubs rather than Geyer's willow growing in the riparian corridor.

Overburden from Past Mining – Between Sample Site #2 and 3

Many signs of past mining activity occur throughout the Horseshoe Canyon drainage. This overburden pile constricts the flow of surface water at this site.

Baneberry at Sample Site #3

This is a poisonous berried shrub. Although it is attractive, the shiny red or white berries are very toxic, especially to children.

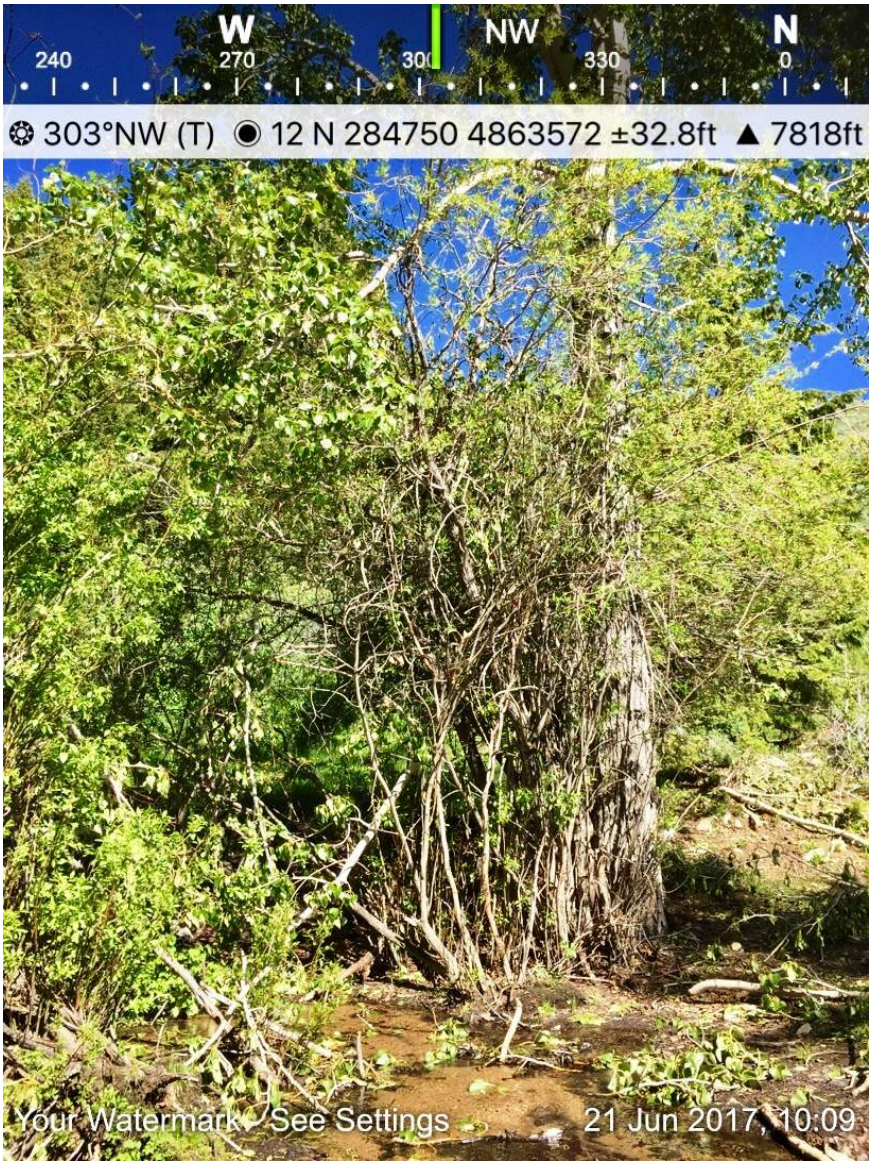
The only place where a population of this semi-shrub was located was at Sample Site #3, at the highest elevation.

Geyer's willow - Sample Site 2

Geyer's Willow grows thickly along the stream's edges from Sample Site 1 up to and above Sample Site #2.

Trailing Black Currant near Sample Site #3

The most common shrub throughout the riverine wetland in Horseshoe Canyon is Trailing black currant (Ribes laxiflorum). Several other currant species are also present in the canyon.

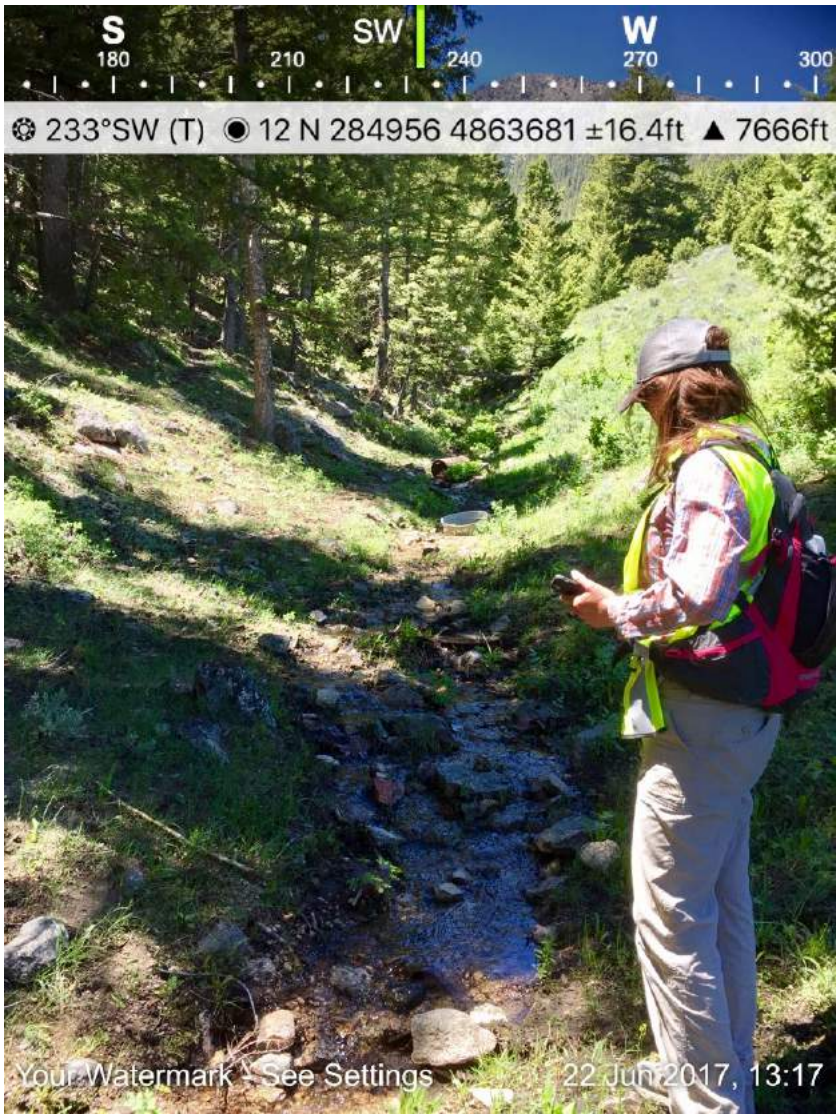


Lanceleaf Cottonwood Adjacent to Road

One large lance-leaf cottonwood grows near Sample Site #1, just to the west of the roadway. Its presence indicates that there is seasonal surface and subsurface slow flow that provides enough water for this tree to continue to grow at this site.

Stream Flowing Across Roadway

The surface water flowing down from higher elevations in Horseshoe Canyon crosses the main roadway that accesses the Empire Mine open pit area. Geyer's willows grow adjacent to the road.

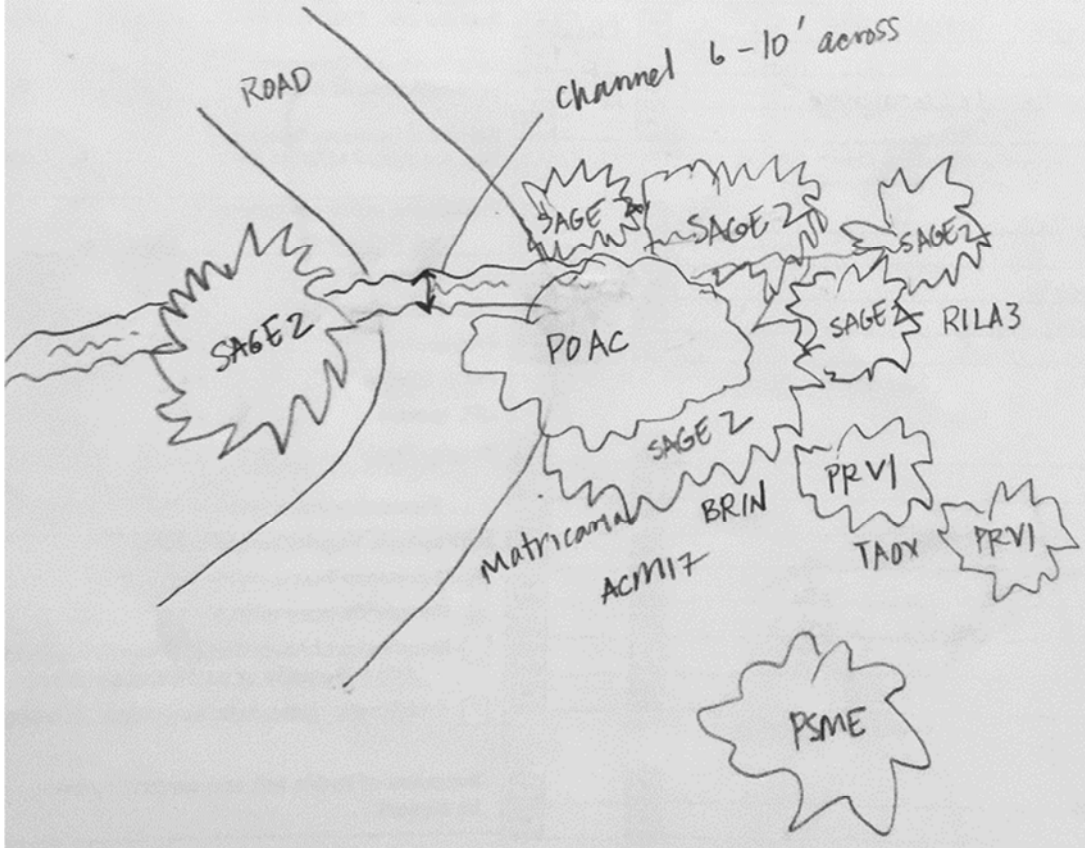


Stream Surface Water Diminishing Below Sample Site #4

Although Sample Site #4 has sufficient vegetation, hydric soils and hydrologic features to be considered a riverine wetland, as the surface water flow travels downhill in elevation it shrinks and narrows until it disappears subsurface, approximately 400 feet below this photo.

SS #1
6/22/2017

GPS 98 7754'
SE side of
stream on road
99 - COSE
100 - SS#2 7772'

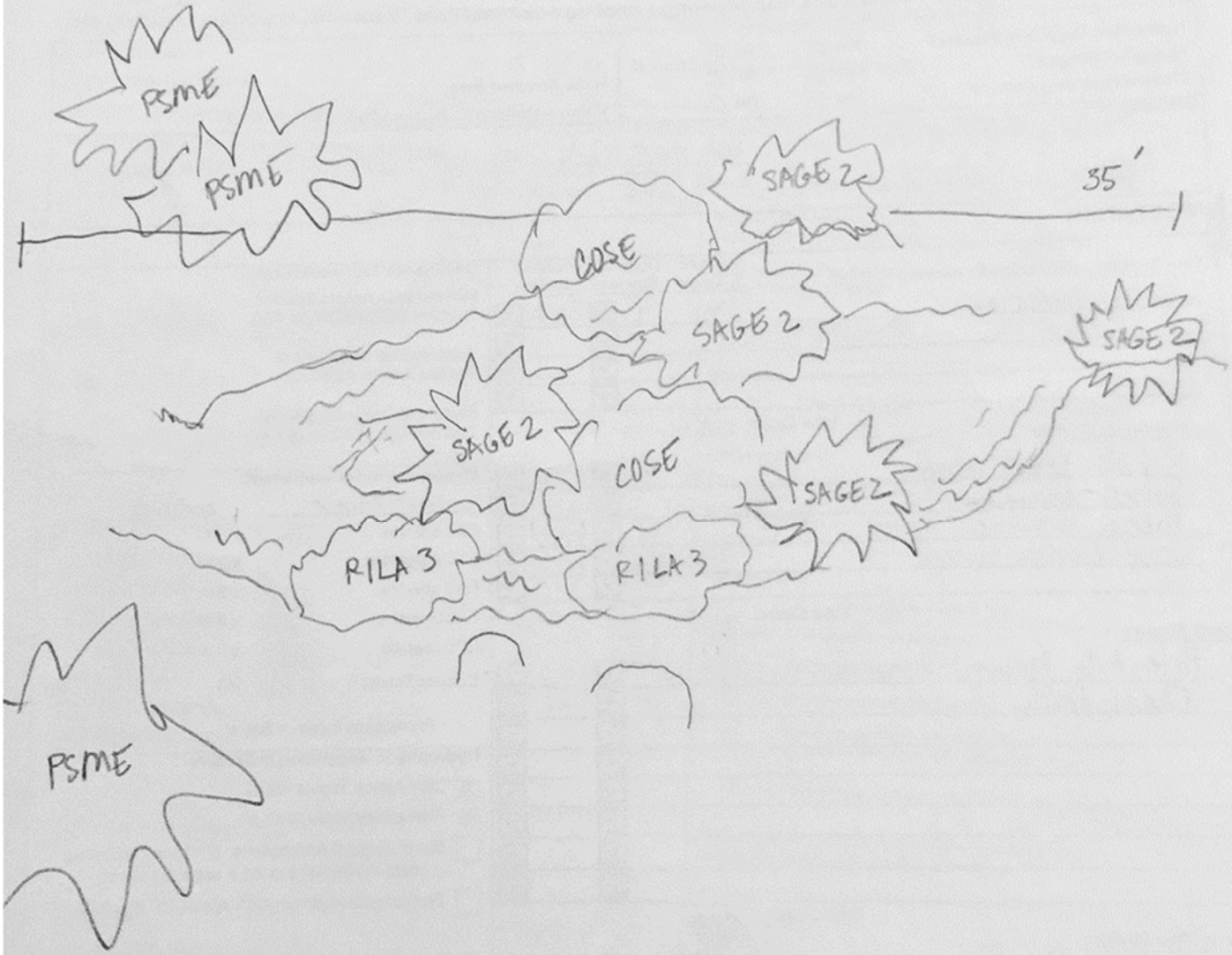


hummingbird
on willow

SS #2

↑N

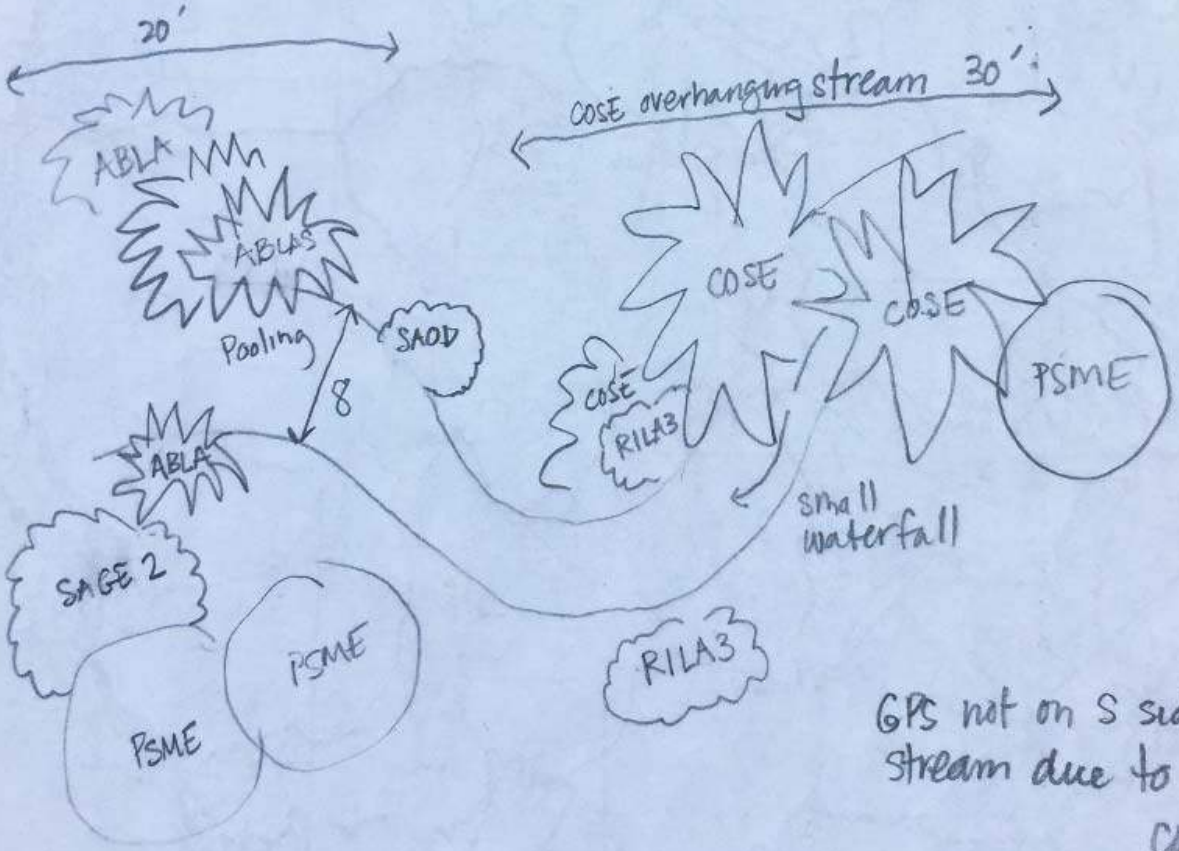
Solocator ph.
tree squirrel
chattering
Placemark 4
on Avenza



6/22/2017

SS #3
GPS # 113
Placemark 6
on Avenza

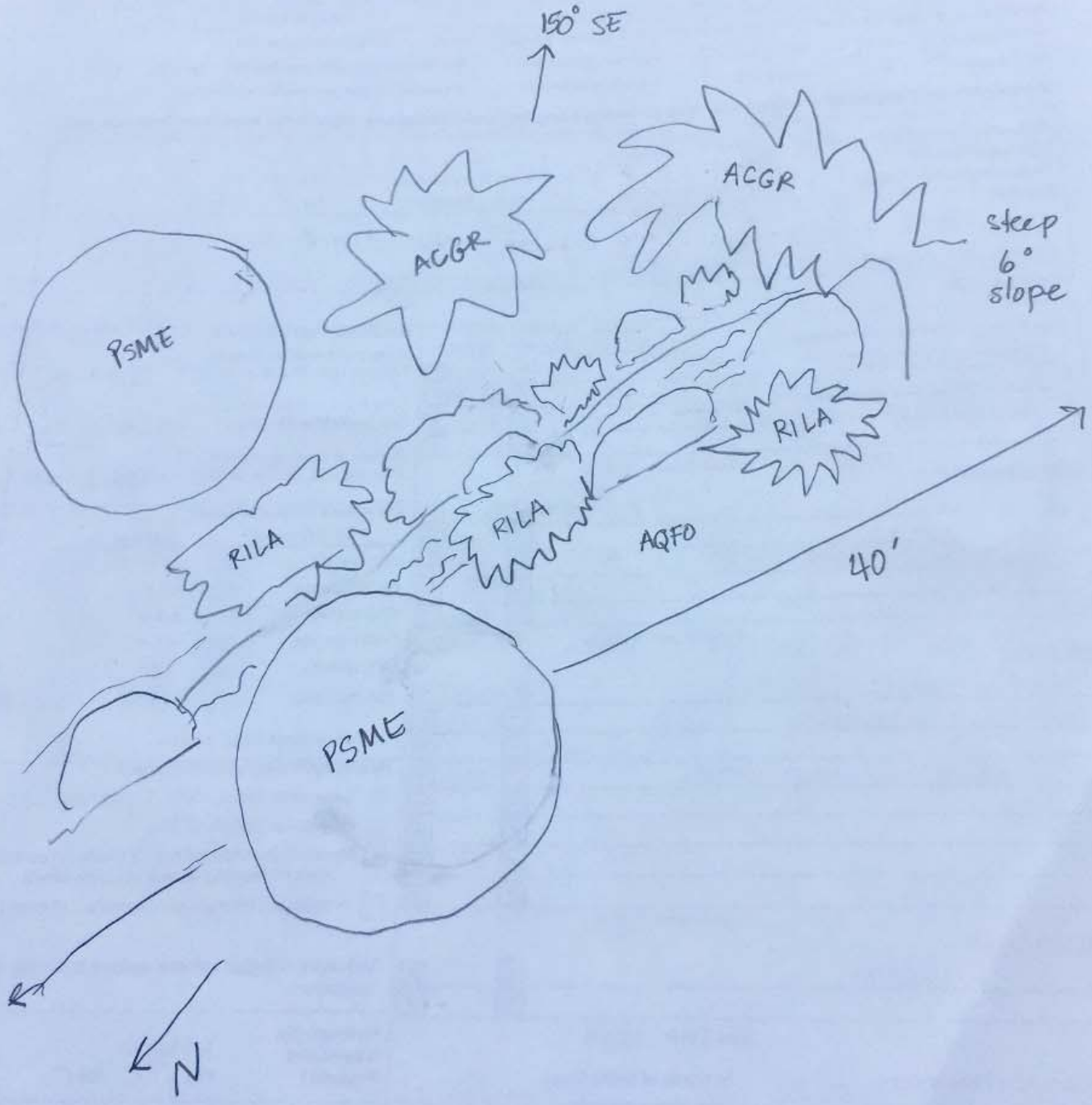
Photo looking S
on Solocator



GPS not on S side of stream due to safety concerns

SS# 4
6/22/2017

Bouldery, very simple veg structure



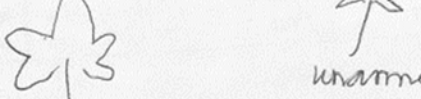
Avenza
Placemark #9

Sampling Site #4
E of road - steep sage slope

Upland
Artfri + Artarb
~~Co~~ Prunus Virginiana
BRIN
FAC URDI Urt dioca - stinging nettle
Mentha
TAOX
ACMI7
Ph long.
CHNA 10
Mert. brevistylis - shortstyle bluebells MEBR
SYAL
VIAD
POSE
lush mix of forbs + mountain shrubs
Acer grand.
ROWO
strawberry
Arabis spp.

Bear Bottom
starwort -
Stellaria jamesiana

Wetland
SAGE2 in channel
running channel 2-6' across
3 Ribes - one armed
R. laxiflo



laxiflorum = trailing black currant
RILA3 = FACU
Mentha
R.
FAC RIIN2 R. inerme - unarmed
Armed
montigenum - mountain prickly currant
or
RILA → lacustre = prickly currant
FACW SS #4
→ Mentha spicata - MESP3
FACW
Brook saxifrage - Saxifraga odontoloma
SAOD2 FACW
Actaea rubra ACRU2 FAC

Appendix F.

Sensitive Wildlife Species List Pre-Survey, June 2017

Appendix F. Sensitive Wildlife Species List Pre-Survey, June 2017

Common Name	Scientific Name	Idaho	USFWS	USFS
Birds				
Bald Eagle	*Haliaeetus leucocephalus*	S3B, S4N		S
Blue Grouse	*Dendragapus obscurus*	S5		
Boreal Owl	*Aegolius funereus*	S2		S
Brewer's Sparrow	*Spizella breweri*	S3B		
Common Yellowthroat	*Geothlypis trichas*	S5B		
Dark-eyed Junco	*Junco hyemalis*	S5		
Golden Eagle	*Aquila chrysaetos*	S3		
Grasshopper Sparrow	*Ammodramus savannarum*	S3B		
Greater-Sage Grouse	*Centrocercus urophasianus*	S2		S
Lesser Goldfinch	*Carduelis psaltria*	S2B		
Lewis's Woodpecker	*Melanerpes lewis*	S3B		
Mountain Chickadee	*Poecile gambeli*	S5		
Northern Flicker	*Colaptes auratus*	S5		
Northern Goshawk	*Accipiter gentilis*	S4		S
Peregrine Falcon	*Falco peregrinus anatum*	S2B		S
Red-tailed Hawk	*Buteo jamaicensis*	S5B, S5N		
Sage Thrasher	*Oreoscoptes montanus*	S3B		
Sharp-shinned Hawk	*Accipiter striatus*	S5		
Short-eared Owl	*Asio flammeus*	S3		
Song Sparrow	*Melospiza melodia*	S5B, S5N		
Turkey Vulture	*Cathartes aura*	S4B		
Western Burrowing Owl	*Athene cunicularia hypugaea*	S3S4		
Mammals				
California Myotis	*Myotis californicus*	S2		
Golden-mantled Ground Squirrel	*Spermophilus lateralis*	S5		
Gray Wolf	*Canis lupus*			S
Hoary Bat	*Lasiurus cinereus*	S4?		
Least Chipmunk	*Neotamias minimus*	S5		
Lynx	*Lynx canadensis*	S1	T	
North American Wolverine	*Gulo gulo luscus*	S2		S
Pygmy Rabbit	*Brachylagus idahoensis*	S3		S
Red Squirrel	*Tamiasciurus hudsonicus*	S5		
Uinta Chipmunk	*Neotamias umbrinus*	S1		
Yellow-pine Chipmunk	*Neotamis amoenus*	S5		

Appendix G.

Avian Point Count Survey Datasheets

Avian point count data sheet (protocol version 3.1)

Date (year/month/day): 2017/06/17 Sampling Unit ID: 3 Conifer

Name of Person Making Observation: KeriAnne Pritchett

Start Time 5:21 am End Time 5:34 Tape or Card #____

No	Genus	Species	Auditory (call, not call song)	Visual (y/n)	*Distance Class	Comments
1			House Finch	N	1	
2			American Robin	N	1	
3			Dark-eyed junco	N	1 + 2	
4			Ruby-crowned kinglet	N	1	
5			Western tanager	Y	1	
6			American crow	Y	1	3 individuals
7	Station #1	6:07 am	crows			
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						

*Distance Class **1**= Observation is less than 10m, **2**=Observation is between 10m and 25m, **3**=Observation is between 25m and 50m, **4**=Observation is greater than 50m, **5**=A fly over.

Avian point count data sheet (protocol version 3.1)

Date (year/month/day): 2017/06/17 Sampling Unit ID: 3 Conifer

Name of Person Making Observation: KeriAnne Pritchett

Start Time 5:21 am End Time 5:34 Tape or Card #____

No	Genus	Species	Auditory (call, not call song)	Visual (y/n)	*Distance Class	Comments
1	Haemorhous	mexicanus	House Finch	N	1	
2	Turdus	migratorius	American Robin	N	1	
3	Junco	hyemalis	Dark-eyed junco	N	1 + 2	
4	Regulus	calendula	Ruby-crowned kinglet	N	1	
5	Piranga	ludoviciana	Western tanager	Y	1	
6	Corvus	brachyrhynchos	American crow	Y	1	3 individuals
7	Station #1	6:07 am	crows			
8	Pooecetes	gramineus	Vesper sparrows	N	2	
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						

*Distance Class **1**= Observation is less than 10m, **2**=Observation is between 10m and 25m, **3**=Observation is between 25m and 50m, **4**=Observation is greater than 50m, **5**=A fly over.

Avian point count data sheet (protocol version 3.1)

Date (year/month/day): 06 / 20 / 2017 Sampling Unit ID: SAGE #2 station

Name of Person Making Observation: Leanna Ballard

Start Time 8:45 End Time 9:35 Tape or Card # Evening short-eared and burrowing owl survey

No	Genus	Species	Auditory (call, not call song)	Visual (y/n)	*Distance Class	Comments
1			Fox sparrow	N	1	
2			Mourning Dove	N	2 dry slope across road	
3			American Robin	N	1	In conifers
4			Hummingbird	N	1	
5	Setophaga	nigrescens	Black-throated Gray Warbler		2	near junipers
6	Sayornis	saya	Say's Phoebe	N	4	
7	Myadestes	townsendi	Townsend's solitare	N	2	
8			Thrush	N	4	in conifers
9			Vesper Sparrow	N	2	
10			House Finch	N	1	
11			Western Tanager	N	2	
12						
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*Distance Class **1**= Observation is less than 10m, **2**=Observation is between 10m and 25m, **3**=Observation is between 25m and 50m, **4**=Observation is greater than 50m, **5**=A fly over.

Avian point count data sheet (protocol version 3.1)

Date (year/month/day): **___6_/__20__/__17___** Sampling Unit ID:____Sage Station 2_____

Name of Person Making Observation: **____KeriAnne Pritchett_____** Start Time _5__:__37_ End Time ___:___ Tape or Card #____

No	Genus	Species	Auditory (call, not call song)	Visual (y/n)	*Distance Class	Comments
1	Spizella	Passerina			2	
2	Empidomax	Hammonidiv			2	
3	Junco	Hyernalis			2	
4	Spazella	breweri			3	
5						
6						
7						
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Avian point count data sheet (protocol version 3.1)

Date (year/month/day): 6 / twentieth / 2017 3 Conifer

Name of Person Making Observation: Leanna Ballard

Start Time 5 : 21 End Time 5 : 54 Tape or Card #____

No	Genus	Species	Auditory (call, not call song)	Visual (y/n)	*Distance Class	Comments
1			- violet green swallows			
2						
3			hermit thrush heard in dense conifer			
4			section			
5			red tailed hawk			
6			circling and calling			
7			on ridgeline near Douglas fir			
8						
9						
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Avian point count data sheet (protocol version 3.1)

Date (year/month/day): 2017/06/21 Sampling Unit ID: 3-Conifer Edge

Name of Person Making Observation: Leanna Ballard clear skies, 50 degrees, 5-15 mph breezes from N

Start Time 5:32 End Time 5:57 Tape or Card #____

No	Genus	Species	Auditory (call, not call song)	Visual (y/n)	*Distance Class	Comments
1			American Robin	N	2	
2			Western tanager	N	2	
3			Vesper Sparrow	N	2	
4			Chipping Sparrow	N	2	
5			Brewer's sparrow	N	2	
6			Hermit thrush	N	3 -in deep PSME	Not heard until 5:54
7					by Horshoe Canyon	
8			Chipping Sparrow	N	285274, 4862830	
9	At open mine	6:30 am				
10			Brewer's Sparrow	N	285315,4861900	
11			Dark-eyed junco	Y	1	watched singing
12			Green-violet Swallows	Y	1	8 individuals
13		at 6:45	Sagebrush Sparrow	Y	2	
14						
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Avian point count data sheet (protocol version 3.1)

Date (year/month/day): 2017/06/21 ? Sampling Unit ID: 3-Conifer Edge

Name of Person Making Observation: Leanna Ballard clear skies, 53 degrees, 5-15 mph breezes from N

Start Time 5 : 32 End Time 5 : 57 Tape or Card #____

No	Genus	Species	Auditory (call, not call song)	Visual (y/n)	*Distance Class	Comments
1			American Robin	y		
2			Cassin's finch	n		
3			kingbird	n		
4			Ruby-crowned kinglet	n		
5			Yellow warbler	y		
6			Hermit thrush	n		Not heard until 5:54
7			Western tanager	y		
8			crows - 2	y		
9	6 am	Station 1	crows	y		
10			vesper sparrow	n	2	
11						
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Avian point count data sheet (protocol version 3.1)

Date (year/month/day): __6__/__21/__2017 Sampling Unit ID:__3 Conifer__

Name of Person Making Observation: __Leanna Ballard_____

Start Time __5__:__21 End Time __5__:__54 Tape or Card #____

No	Genus	Species	Auditory (call, not call song)	Visual (y/n)	*Distance Class	Comments
1						
2						
3						
4						
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Avian point count data sheet (protocol version 3.1)

Date (year/month/day): 2017/06/21 Sampling Unit ID: 3-Conifer Edge

Name of Person Making Observation: Leanna Ballard clear skies, 50 degrees, 5-15 mph breezes from N

Start Time 5:32 End Time 5:57 Tape or Card #____

No	Genus	Species	Auditory (call, not call song)	Visual (y/n)	*Distance Class	Comments
1			American Robin			
2			Western tanager			
3			Vesper Sparrow			
4			Chipping Sparrow			
5			Brewer's sparrow			
6			Hermit thrush			Not heard until 5:54
7						
8						
9						
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25						

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Avian point count data sheet (protocol version 3.1)

Date (year/month/day): 2017/06/21 Sampling Unit ID: 3-Conifer Edge

Name of Person Making Observation: Leanna Ballard clear skies, 50 degrees, 5-15 mph breezes from N

Start Time 5:32 End Time 5:57 Tape or Card #____

No	Genus	Species	Auditory (call, not call song)	Visual (y/n)	*Distance Class	Comments
1			American Robin			
2			Western tanager			
3			Vesper Sparrow			
4			Chipping Sparrow			
5			Brewer's sparrow			
6			Hermit thrush			Not heard until 5:54
7						
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Avian point count data sheet (protocol version 3.1)

Date (year/month/day): 6 / 23 / 2017 Sampling Unit ID: 1

Name of Person Making Observation: Leanna Ballard

Start Time 5 : 21 End Time 5 : 54 Tape or Card # 3 sky clear 45 degrees

No	Genus	Species	Auditory (call, not call song)	Visual (y/n)	*Distance Class	Comments
1	Poecile	gambeli	Mountain chickadee	N	2	very quiet morning
2	Turdus	migratorious	Robin	N	2	
3	Spizzela	passerina	Chipping Sparrow	N	3	
4	Spizella	breweri	Brewers sparrow	N	3	
5						
6	Bullion Gulch	5:49-6:00 am	still sky			
7	Poecile	gambeli	Mountain chickadee	N	2	
8	Spizella	breweri	Brewer's sparrow	N	2	
9	Passerella	ilaca	Fox sparrow	N	2	
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25						

*Distance Class **1**= Observation is less than 10m, **2**=Observation is between 10m and 25m, **3**=Observation is between 25m and 50m, **4**=Observation is greater than 50m, **5**=A fly over.

Avian point count data sheet (protocol version 3.1)

Date (year/month/day): 6 / 23 / 2017 Sampling Unit ID: 1

Name of Person Making Observation: Leanna Ballard

Start Time 5 : 21 End Time 5 : 54 Tape or Card # 3 sky clear 45 degrees

No	Genus	Species	Auditory (call, not call song)	Visual (y/n)	*Distance Class	Comments
1	Poecile	gambeli	Mountain chickadee	N	2	very quiet morning
2	Turdus	migratorious	Robin	N	2	
3	Spizzela	passerina	Chipping Sparrow	N	3	
4	Spizella	breweri	Brewers sparrow	N	3	
5						
6	Bullion Gulch	5:49-6:00 am	still sky			
7	Poecile	gambeli	Mountain chickadee	N	2	
8	Spizella	breweri	Brewer's sparrow	N	2	
9	Passerella	ilaca	Fox sparrow	N	2	squirrels - bushy tail
10	Haemorhous	mexicanus	House finch	N	2	
11						
12	8:04	Placemark 17 (Avenza)				
13			House Finch	N	2	
14			Cassin's finch	N	2	
15			Hermit thrush	N	3	
16			Chipping Sparrow	N	2	
17			Ruby-crowned kinglet	N	2	
18	Placemark 16 - 284962, 4863036					
19			Humming Bird	N	2	
20	Placemark 18					
21			Dark-eyed junco	Y	1	
22	SAGE		Fox sparrow	N	1	
23			Humming Bird	Y	1	
24			chickadee	N	2	
25						

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