Appendix D

Biological Resources Report

BIOLOGICAL RESOURCES REPORT

PINE CREEK MINE HYDROELETRIC PROJECT
(FERC PROJECT NO. 12532-002)

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TABLE OF CONTENTS

Page #

TABLES

EXHIBITS

APPENDICES

1.1 INTRODUCTION

Biologists with Glenn Lukos Associates, Inc. (GLA) conducted general and focused biological surveys for the Pine Creek Mine Hydroelectric Project (Proposed Project) located near the City of Bishop, Inyo County, California. Surveys for target wildlife species were conducted in accordance with the methodologies outlined in the *Final Revised Proposed Study of Special Status Wildlife*[1], prepared for the Federal Energy Regulatory Committee (FERC) on August 15, 2012. This report provides a description of the Proposed Project, results of the general and focused biological surveys, an analysis of impacts to target species, and relevant mitigation/avoidance measures.

1.2 Project Location

The Proposed Project is located at the Pine Creek Mine, which is bounded on three sides by the John Muir Wilderness area within the Inyo National Forest, near the City of Bishop, Inyo County, California [Exhibit 1 – Regional Map]. The Pine Creek Mine is located at latitude 37.359371 and longitude -118.700118, within Section 8, Township 7 South, and Range 30 East on the U.S. Geological Survey (USGS) topographic map Mount Tom, California [dated 1982 and photorevised in 1994]) [Exhibit 2 – Vicinity Map].

The Pine Creek Mine is located near the confluence of Morgan and Pine Creeks. Morgan Creek is an ephemeral creek that flows for a total of 2.7 linear miles from its headwaters at 9,200 feet elevation to its terminus at 7,800 feet elevation, where it joins Pine Creek. Pine Creek is a total of 9.9 linear miles in length from its origination at an elevation of 11,120 feet, at Pine Creek Pass, to its terminus at 7,800 feet elevation, where it joins Morgan Creek.

The underground portion of the Pine Creek Mine comprises over 100 miles of underground workings that were used for tungsten mining and processing from 1916 to 2000. The Proposed Project facilities are to be located approximately 2,500 feet underground from the Easy-Go Portal within the Easy-Go Adit of the Pine Creek Mine along an existing mine access drift.

Exhibit 3 depicts the Proposed Project biological study area, which consists of the external facilities of the Pine Creek Mine, relevant reaches of Morgan and Pine Creeks, and a buffer extending approximately 250 linear feet from the edge of the discernable riparian habitat associated with Morgan and Pine Creeks. In general, the study area represents the locations outside of Mount Morgan that may be impacted directly or indirectly as a result of the Proposed Project, either through operation and maintenance activities or the discharge of mine flows. Since there will be no surface impacts to Mount Morgan as a result of the project, biological studies on the surface of Mount Morgan were not conducted. The reach of Morgan Creek within the study area includes sections upstream and downstream of the point of convergence with the mine discharge flow. The reach of Pine Creek within the study area includes sections upstream and downstream of the point of convergence with Morgan Creek.

[1] *Final Revised Proposed Study of Special Status Wildlife*, Glenn Lukos Associates, August 15, 2012.

1.3 Project Description

The Proposed Project consists of a hydroelectric project that would use drainage water from the mine to generate renewable energy that could feed into the local distribution grid. Aquifer and ground water sources draining through the mine tunnel system generate a total sustainable discharge averaging approximately seven cubic feet per second (cfs).[2] Employing a plug located at the outlet of the integrated workings would allow water to be stored in the workings. This would result in significant head pressure that, when combined with the total water flowing from the system, would create a potential hydroelectric energy source upon which the conceptual project design is based. The Proposed Project would develop the head created by plugging the Easy-Go Adit. The estimated average energy production of the Proposed Project is 5,600,000 kilowatt-hours per year (kWH/year). The proposed facilities could be configured to provide peak power during times of low grid reserves depending on the final plant design; however, Pine Creek Mine proposes a non-peaking flow-of-the-river design (J. Francis, personal communication, February 27, 2013). There would be no consumptive use of water after the initial fill of the mine workings water system.

1.3.1 Existing Facilities

Mine facilities related to the Proposed Project are currently inactive. The inactive mine tunnel system creates the opportunity to adapt an existing plug near the mouth of the Easy-Go Adit tunnel with existing discharge piping facilities to control flow and head potential through the mine tunnels and shafts to create hydroelectric power. The existing concrete plug in the Easy-go Adit mine tunnel is capable of storing water up to 1,320 feet of gross head above the plug elevation. The plug is located approximately 2,500 feet inside from the mine portal, at an elevation of approximately 8,080 feet above sea level. The plug is approximately 12 feet wide by 12 feet high by 30 feet thick. Exhibit 4 shows a plan view of the existing tunnel course and the proximity of the tunnel plug to the mine portal. The plug is not currently storing or diverting water inside the mine.

Ground water draining from within the mine currently flows unimpeded through openings in the plug to a trench exiting the mine portal and into Morgan Creek. The proposed penstock for the installation would use an 18-inch steel pipe through the existing plug. Exhibit 5 shows the existing mine plug and proposed project penstock and turbine unit. Discharge from the generating facility will be placed into the existing mine water discharge conduit and eventually into the streambed of Morgan Creek.

1.3.2 New Facilities

As indicated in Exhibit 5 (same as above), all new generating facilities will be located entirely underground in the existing mine tunnel connected to the existing plug by a penstock approximately 30 feet long. The proposed facilities will have a total installed capacity of 1,500 kW with a design maximum head of 1,320 feet and an average discharge capacity of 10 cfs (J. Francis, personal communication, February 27, 2013). The proposed facilities will store up to

[2] *Pine Creek Mine Hydroelectric Project FERC No. 12532*, Pre-Application Document, Final, February 2008.

200 acre-feet of ground water within the mine and have a maximum underground water surface elevation of 9,400 feet above sea level.

The Proposed Project will require no new equipment or structures above ground, no alteration of existing ground surface or streambeds, no new roads or transmission lines, and no additional parking facilities. The groundwater collecting in the existing mining tunnels, upon passing through the proposed underground hydro-electric generator, will continue to discharge as it does currently into the existing mine water discharge system near the confluence of Morgan and Pine Creeks Morgan Creek.

1.3.3 Project Transmission

The proposed site would use the existing mine operation substation connections to the local utility. The existing substation facility at the site is sized for several times the expected output of the proposed development. The connecting substation is connected to a Southern California Edison owned substation and transmission line operating at 12.5 kV. An existing 500 MCM mine power line runs from the portal to the tunnel plug. This power line will be connected to the generator at the plant end and the other end connected to the owner owned substation off the main sub located 100 feet from the portal.

1.3.4 Construction Methods

Manufacturing of all new generating facilities and substantial pre-assembly will occur off site and be trucked to the location. Within the temporary staging area, a portable crane will lift and position the wheeled generating equipment onto the existing railroad track for delivery to the plug location by locomotive. The wheeled generating equipment will be secured to an existing concrete foundation with in-bed tie-downs. The turbine will be bolted to the existing 18-inch flange on the plug. The water will flow through the turbine, resulting in reduced water pressure, and will be discharged into a plenum (water box), which will be pre-constructed and installed on the wheeled equipment. The water would then exit the plenum, fall directly into the existing ditch, and discharge to the portal entrance. Electrical connections will occur at the generator (existing cable with four bolts) and at the portal entrance above ground using board-joint splices to existing cable. Final assembly of all generating facilities will be completed in approximately two weeks with two workers.

During construction, measures will be taken to ensure that soil erosion is minimized by using best management practices during the construction phase of the Proposed Project. Access roads and construction areas will be voluntarily maintained by mine staff to control erosion and run-off. Standard erosion control and prevention procedures will be implemented to minimize the level of disturbance at the site during any project-related construction activities. These measures would include minimizing disturbance to the naturally vegetated riparian corridor, diverting any concentrated run-off that occurs on erosive topography through diversion of water to more porous material, implementation of mulching and seeding of bare areas in the construction zone, and the installation of sediment barriers such as silt fences and staked hay bales.

1.3.5 Project Operation & Maintenance

The Proposed Project will operate in run-of-the-river mode using a hydraulic turbine discharging at an average rate of 10 cfs.

The existing Pine Creek Mine facilities are maintained by a staff that resides onsite with their families. This same staff will continue to operate and maintain the proposed facilities. As such, the long-term operation and maintenance will result in little to no change in the number of personnel on site or frequency of vehicle trips into and out of the site. In addition, operation of the facilities will not result in a significant (if any) change as it relates to noise, lighting, dust generation, etc.

2.1 METHODOLOGY

The *Final Revised Proposed Study of Special Status Wildlife* states that operation and maintenance of the Proposed Project may have a significant, measurable adverse effect on special-status wildlife, and that the effect may be direct, indirect or cumulative. The biological surveys discussed in this report focused on an approved list of target wildlife species that included the Sierra Nevada bighorn sheep (*Ovis canadensis sierra*), special-status bats, special-status salamanders, and the Yosemite toad (*Bufo canorus*). In addition to surveys for these target species, GLA biologists evaluated the effect of the Proposed Project on vegetation communities and special-status plants. Floral and faunal compendia are included as Appendices A and B.

The biological surveys, including botanical surveys and amphibian surveys, were conducted by GLA biologists Jeff Ahrens, Jason Fitzgibbon, and David Moskovitz. GLA biologists visited the site on June 1 and 2, July 10 and 11, August 7, and September 24 and 25, 2012. Bat surveys were conducted by Dr. Patricia Brown. Winter bat surveys were conducted on January 2 and February 16, 2012. Summer out-flight surveys were conducted on August 21, 2011 and June 1, 2012. Table 2-1 provides a summary list of survey dates, survey types and personnel.

Table 2-1. Summary of Biological Surveys

Survey Type	Survey Dates	Surveying Biologist
Habitat Assessment General Biological Survey	6/1/12, 6/2/12	JA, JF
Plant Surveys & Vegetation Mapping	7/10/12, 7/11/12, 8/7/12, 9/24/12, 9/25/12	JA, JF, DM
Amphibian Surveys	6/1/12, 6/2/12, 7/10/12, 7/11/12, 8/7/12, 9/24/12, 9/25/12	JA, JF, DM
Bat Surveys	8/21/11, 1/2/12, 2/16/12, 6/1/12	PB

JA-Jeff Ahrens, JF-Jason Fitzgibbon, DM-David Moskovitz, PB-Patricia Brown

2.2 Botanical Resources

2.2.1 Vegetation Mapping

Vegetation communities were mapped in the field onto an aerial photograph. If noxious weeds were encountered, they would be mapped in the field using a Global Positioning System (GPS) device.

2.2.2 Focused Plant Surveys

GLA reviewed pertinent literature on the flora of the region prior to conducting fieldwork. A thorough archival review was conducted using available literature and other historical records. These resources included, but were not limited to, the following:

- California Native Plant Society *Online Inventory of Rare and Endangered Plants of California* (Eighth Edition) [CNPS 2010]; and
- California Natural Diversity Data Base (CNDDB) for the USGS Mount Tom 7.5-minute quadrangle map (CNDDB 2013).

GLA reviewed the Project Area to identify areas with the potential to support special-status plants, including habitats and other physical features that may support special-status plants. If noxious weeds were encountered, they would be mapped using GPS. Table 2-2 provides a list of special-status plants evaluated for the Proposed Project.

Table 2-2. Special-Status Plants Evaluated for the Proposed Project

Species	Status	Habitat
Astragalus monoensis Mono milk-vetch	Federal: None State: None CNPS: List 1B.2	Pumice (gravelly or sandy) in Great Basin scrub and upper montane coniferous forest.
Astragalus ravenii Raven's milk-vetch	Federal: None State: None CNPS: List 1B.3	Gravelly soils in alpine boulder and rock fields, and upper montane coniferous forest.
Carex scirpoidea ssp. *pseudoscirpodea* Western single-spiked sedge	Federal: None State: None CNPS: List 2.2	Mesic (often carbonate) soils in alpine boulder and rock fields, meadows and seeps, and subalpine coniferous forest (rocky).
Draba sierrae Sierra draba	Federal: None State: None CNPS: List 1B.3	Granitic or carbonate soils in alpine boulder and rock fields.
Lupinus padre-crowley Father Crowley's lupine	Federal: None State: None CNPS: List 1B.2	Decomposed granitic soils in Great Basin scrub, riparian forest, riparian scrub, and upper montane coniferous forest.

2.3 Sierra Nevada Bighorn Sheep

The Proposed Project is located within U.S. Fish and Wildlife Service (USFWS)-designated Critical Habitat for the Sierra Nevada bighorn sheep (SNBS), and SNBS has been detected within the Proposed Project.

2.3.1 SNBS Background Information

The SNBS is one of three distinct subspecies of bighorn sheep and has the most restricted range and fewest individuals of the three.[3] SNBS occur only in the Sierra Nevada mountain range. Historically, bighorn sheep were distributed along the crest of the Sierra Nevada mountain range in California, from the Sonora Pass in the north, to Olancha Peak in the south (CDFG 2012). Presently, SNBS inhabit portions of the Sierra Nevada mountain range located along the eastern boundary of California in Fresno, Inyo, Mono, Tulare, and Tuolumne Counties (USFWS 2008). Habitat occurs from the eastern base of the Sierra Nevada mountain range as low as 1,460 meters (4,790 feet) to peaks above 4,300 meters (14,100 feet). SNBS use low-elevation ranges extensively in winter and early spring, alpine ranges in summer and fall, and some intermediate ranges during transition periods (Wehausen 1980). SNBS inhabit open areas where the land is rocky, sparsely vegetated, and characterized by steep slopes and canyons (Wehausen 1980).

According to the USFWS, the three primary constituent elements (PCEs) that are essential to the conservation of the SNBS include: (1) Non-forested habitats or forest openings within the Sierra Nevada from 1,219 meters (4,000 feet) to 4,420 meters (14,500 feet) in elevation with steep (greater than or equal to 60 percent slope), rocky slopes that provide for foraging, mating, lambing, predator avoidance, and bedding and that allow for seasonal elevational movements between these areas; (2) Presence of a variety of forage plants as indicated by the presence of grasses (e.g., *Achnanthera* spp.; *Elymus* spp.) and browse (e.g., *Ribes* spp.; *Artemisia* spp., *Purshia* spp.) in winter, and grasses, browse, sedges (e.g., *Carex* spp.) and forbs (e.g., *Eriogonum* spp.) in summer; and (3) Presence of granite outcroppings containing minerals such as sodium, calcium, iron, and phosphorus that could be used as mineral licks in order to meet nutritional needs.

Bighorn sheep numbers were estimated to be over 1,000 individuals prior to European settlement (CDFW 2012). However, in the 19th and 20th centuries, the bighorn population in the Sierras was severely reduced as a result from respiratory diseases from domestic sheep, forage competition with domestic livestock, and market hunting (CDFW 2012). By the late 1970's, the bighorn sheep population was reduced to approximately 250 individuals and occurred only in the vicinity of Mt. Baxter and Mt. Williamson (CDFW 2012).

The California Department of Fish and Wildlife (CDFW) began re-introducing the SNBS throughout its historic range (beginning in Wheeler Ridge, Mt. Langley, and Mono Basin) between 1979 and 1988. However, the bighorn population continued to decline to a low of approximately 100 individuals by 1995 from a combination of drought and mountain lion predation (CDFW 2012). As a result of the declining population, the SNBS was initially listed

[3] The two additional subspecies of bighorn sheep in America include the Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*) and the desert bighorn sheep (*Ovis canadensis nelsoni*).

under the California Endangered Species Act (CESA) in 1974 as threatened and subsequently listed as endangered in 1999. The USFWS temporarily listed the SNBS as endangered in 1999 under the Federal Endangered Species Act (FESA). Final listing as endangered occurred in 2000.

CDFW was identified as the lead agency to implement the recovery of the SNBS. The USFWS issued the Final Recovery Plan for SNBS on September 24, 2007 (USFWS 2007). The Recovery Plan identified 16 historic Herd Units (populations) that were further classified into four Recovery Units (metapopulations). In order to down list the SNBS from the ESA, the recovery plan calls for a minimum of 305 females to be distributed among the four recovery units and for 12 of the 16 historic herd units to be occupied. This condition must persist for seven consecutive years.

Critical habitat for the SNBS was designated by the USFWS on August 5, 2008 and the Proposed Project is located within the Wheeler Ridge Unit, which is part of the Central Recovery Unit [Exhibit 6]. Between 1999 and 2011, the SNBS population of this unit has increased from just over 100 animals to approximately 400 (CDFW 2012). Of the 12 Herd Units required for recovery (USFWS 2007), four units remain vacant as of 2011 (CDFW 2012).

2.3.2 Project Study Methodology

CDFW has monitored the SNBS Wheeler Unit continuously (beginning in 1979 with the reintroduction of SNBS), using a variety of methods including radio telemetry (VHF), GPS collars, and ground observations. Based on CDFW's thorough monitoring of the SNBS, and because the SNBS has been documented within and immediately adjacent to the Project area, GLA did not conduct focused surveys for the SNBS. Instead, GLA conducted a thorough literature review of the Wheeler Ridge Unit from a variety of sources which include but are not limited to: (1) California Natural Diversity Database (CNDDB 2013), (2) Final Rule Listing the SNBS as Endangered, (3) Designation of Critical Habitat for the SNBS (USFWS 2008), (4) SNBS Final Recovery Plan (USFWS 2007), (5) quarterly and semi-annual population monitoring and other relevant reports from the CDFW Sierra Nevada Bighorn Sheep Recovery Program Literature portal (http://www.dfg.ca.gov/snbs/Literature.html), (6) personal communication with CDFW Wildlife Biologist Alexandra Few and CDFW Geographic Information Systems (GIS) Specialist Kathleen Knox from the CDFW Bishop Field Office, and (7) personal communication with Pine Creek Mine on-site property manager Tom Haenni.

GLA obtained all available data from CDFW, including VHF, Global Positioning System (GPS) and ground observation data for the SNBS Wheeler Ridge Unit obtained from 2001 through July 2012. Depending on the model of GPS collar used (e.g., ATS, Lotek, Northstar, Tellus), some collars are programmed to record detections (i.e., locations) from one to three or more times a day (K. Knox, personal communication, November 15, 2012). It should also be noted that a detection point does not identify the number of sheep accompanying the collared individual. Because SNBS are gregarious, it can be inferred that a detection point generally indicates the location of more than one animal. GLA incorporated all SNBS location information obtained from CDFW for GIS analysis. CDFW also provided GLA with the most current information on

SNBS lambing locations, and population and demography structure for the Wheeler Ridge Herd Unit, for which Exhibits 6 and 9 are derived.

In addition to the literature review, GLA conducted seven site visits (June 1 and 2, July 10 and 11, August 7, and September 24 and 25, 2012). GLA noted and mapped SNBS detected during the site visits.

2.4 Bats

Portions of the Project area contain suitable habitat for various bat species, particularly rocky outcrops and crevices in cliff faces adjacent to the site, as well as the two primary mine portals (the Main Portal and the Easy-Go Adit). Dr. Patricia Brown (Brown-Berry Biological Consulting) conducted four focused bat surveys within the two mine portals. Two more mine portals lie approximately 400 feet due south of the Main Portal and Easy-Go Adit, but were not surveyed, as the Proposed Project will not affect these portals.

Dr. Brown conducted both summer out-flight and winter bat surveys. The first summer survey was conducted on August 21, 2011, with the second summer survey conducted on June 1, 2012. Winter bat surveys were conducted on January 2, 2012 and February 16, 2012. All surveys were conducted by walking slowly from the entrances of the Main Portal and Easy-Go Adit to the existing concrete plug (approximately 2,500 feet into the mine). Bright lights were used to visually scan all areas determined to be suitable for hibernating bats, as well as the floor of the mine for bat sign such as guano.

For the summer out-flight surveys, Anabat II acoustic ultrasound detectors were also used to identify bats. On August 21, 2011, one detector was placed at the Easy-Go Adit portal entrance and another was placed in a nearby open area adjacent to the mine buildings. On June 1, 2012, detectors were placed at each portal entrance. During both surveys, night vision (augmented by infrared lighting) was employed to detect bats entering and exiting the two portal entrances for 60 minutes after dusk. Bats were counted using finger tallies as they entered and exited from the portals.

Identification of species from Anabat II recordings was made by comparison with "voucher" calls from known, hand-released bats. "Search phase" calls, emitted while bats are foraging, are often much more definitive than "voucher" calls, but may differ from the hand-released bat "voucher" calls. Additionally, different bat species may also utilize similar signals or the same species may employ a variety of signals based on the perceptual task and surrounding habitat. When bats are flying within a confined space, such as a mine portal, the signals can vary from search phase calls. Usually the ending frequency in a FM (frequency modulated) signal is the most diagnostic, since atmospheric attenuation of the higher frequencies in the call is more severe than the lower based on the perceptual task and surrounding habitat. A knowledge of which bats are comment to the area as well as bats that may be present but uncommon is essential to the acoustic identification process. Several points need to be considered when interpreting the acoustic data: some calls will be misidentified; the louder bats will be over represented; "whispering" bats such as Townsend's big-eared bats may not be recorded; and the number of calls recorded is an index of bat activity and does not equate to the number of bats.[4]

GLA biologists also surveyed the mine Project area on the evenings of June 2, July 11, August 7, and September 24, 2012, GLA biologists surveyed the mine from the entrances of both portals, to the existing concrete plug. Surveys were conducted by two biologists walking side-by-side in a slow and methodical manner. Flashlights were used to thoroughly scan the floors, walls and ceilings of the mine for any roosting bats or bat sign.

2.5 Amphibians

Portions of the Project study area contains potentially suitable habitat for special-status amphibians, including the Yosemite toad (*Bufo canorus*), Sierra Nevada yellow-legged frog (*Rana sierrae*), and the Mount Lyell salamander (*Hydromantes platycephalus*). A discussion of each species is provided below. GLA biologists conducted focused amphibian surveys during all site visits (June 1 and 2, July 10 and 11, August 7, and September 24 and 25, 2012). Focused surveys for the Yosemite toad and Sierra Nevada yellow-legged frog followed accepted amphibian sampling protocols (Crump and Scott 1994, Fellers and Freel 1995, Lind 1997, Seltenrich and Pool 2002, and Thoms et al. 1997). The survey visits included both daytime and nighttime visual inspection surveys of all areas of suitable habitat including the man-made ponds and slow-moving areas of the creeks in order to search for egg masses, tadpoles, and/or adults. Where appropriate, GLA biologists sampled areas of suitable habitat using dip nets.

Surveys were concentrated within the reaches of Pine Creek and Morgan Creek, but other areas of potentially suitable habitat were considered within the overall Project study area. Focused surveys for the Mount Lyell salamander were conducted in conjunction with the Yosemite toad and yellow-legged frog within areas of Pine and Morgan Creeks and within rocky areas in close proximity to man-made pools located within the disturbed mine footprint. In addition, because salamanders have been detected in mines (P. Brown, personal communication, June 1, 2012), GLA biologists surveyed inside the mine from the portal entrances to the existing concrete plug using flashlights to scan the walls and floors of the mine.

In addition, GLA conducted a thorough literature review of sensitive amphibian locations within the vicinity of the Proposed Project from a variety of sources which include but are not limited to: (1) California Natural Diversity Database (CNDDB 2013), (2) personal communication with CDFW Fisheries Biologist James Erdman, (3) review of CDFW High Mountain Lake (HML) surveys day provided by Mr. Erdman, and (4) review of Mt. Lyell salamander location data from Chris Fichtel (October 2004), provided by Mr. Erdman.

2.5.1 Yosemite Toad

The Yosemite toad is designated as a Federal Candidate for listing as Endangered, and as a California Species of Special Concern. The Yosemite toad is endemic to California and occurs in the Sierra Nevada from the Blue Lakes region north of Ebbetts Pass (Alpine County) south to 5 km south of Kaiser Pass in the Evolution Lake/Darwin Canyon area (Fresno County). Its

[4] Brown-Berry Biological Consulting. Letter from Patricia Brown to Lynne Goodfellow, dated September 14, 2011.

known elevational range extends from 1950 m (Aspen Valley, Tuolumne County) to 3450 m (Mount Dana, Tuolumne County (Karlstrom 1962).

The Yosemite toad is a moderately sized toad (30.0-71.0 mm Snout-Vent Length, SVL) toad with rounded to slightly oval parotoid glands (Karlstrom 1962). Female toads have black blotches or spots edged in white or cream that are set against a brown, gray or tan ground color. Females also have prominent black spots or bars on the legs. Males, in contrast have a nearly uniformly colored yellow-green to drab olive to darker greenish brown dorsum. A pencil-thin middorsal stripe is present in both juvenile males and females, but this stripe is lost more rapidly in males than females as they grow in size, resulting in younger adult females retaining a stripe fragment, whereas males of the same age generally lose the stripe entirely (Jennings and Hayes 1994).

The Yosemite toad is a high elevation endemic that generally occurs in high montane and subalpine associations in open montane meadows, although forest cover around meadows has also been reported (Karlstrom 1962, Kagarise Sherman and Morton 1984). Suitable breeding sites generally occur along the found edges of meadows or slow, flowing runoff streams. Short emergent rushes (Juncus spp.) or sedges (Carex spp.) usually dominate such sites. Yosemite toads are generally never far from a permanent source of water, even though they spend most of their time on land. Yosemite toads overwinter in rodent burrows. Generally Yosemite toads prefer the burrows of Belding's ground squirrels (*Spermophilus beldingi*) and yellow-bellied marmots (*Marmota flaviventris*) most likely because their greater burrow depths most likely make such overwintering sites less susceptible to freezing (Kagarise Sherman 1980). These burrows are also probably used as temporary refuge sites during the summer season (Mullally and Cunningham 1956).

The Yosemite toad is predominantly diurnal and emerges from winter hibernation as soon as snow-melt pools form near their winter refuge sites (Karlstrom 1962, and Kagarise Sherman 1980). Yosemite toads generally emerge from early May to mid-June, but will vary with elevation and season (Kagarise Sherman 1980). Breeding occurs shortly after emergence with males often forming breeding choruses (Jennings and Hayes 1994). The eggs of Yosemite toads are generally larger than that of other toads (Large eggs (2.1 mm average diameter), and are brownish black or jet black over the upper three-fourths and gray or tannish gray on the lower fourth. Eggs are generally deposited in strings of single or double strands (Karlstrom and Livezey 1955). Females deposit on average between 1,000 and 1,500 eggs (Kagarise Sherman 1980). Eggs strands are typically wound around short emergents in shallow (I 7.5 cm deep), in relatively still water with a flocculent or silty bottom (Karlstrom 1962). Following breeding, adults forage in subalpine meadows until entering hibernation (Kagarise Sherman 1980). Larvae hatch in 3-6 days, depending on temperature, and typically metamorphose 40-50 days after fertilization (Jennings and Hayes 1994). Immature tadpoles have been observed well into September. Yosemite toad tadpoles, like many species of toad tadpoles, are black and tend to aggregate (Brattstrom 1962). Yosemite toad tadpoles generally remain in shallow warmer water pools (average 23.3°C) and slow moving streams during the day (Cunningham 1963), but will move to deeper water at night (Mullally 1953).

2.5.2 Sierra Nevada Yellow-Legged Frog

The Sierra Nevada yellow-legged frog was designated by CDFW as a State Candidate for listing as Endangered or Threatened on September 21, 2010. Until recently, *R. sierra* and the mountain yellow-legged frog (*R. muscosa*) were considered the same species. Historically, *R. sierrae* ranged from the Diamond Mountains northeast of the Sierra Nevada in Plumas County, California, south through the Sierra Nevada to the type locality, the southern-most locality (Inyo County). In the extreme northwest region of the Sierra Nevada, several populations occur just north of the Feather River, and to the east, there was a population on Mt Rose, northeast of Lake Tahoe in Washoe County, Nevada, but it is now extinct. West of the Sierra Nevada crest, the southern part of the *R. sierrae* range is bordered by ridges that divide the Middle and South Fork of the Kings River, ranging from Mather Pass to the Monarch Divide. East of the Sierra Nevada crest, *R. sierrae* occurs in the Glass Mountains just south of Mono Lake (Mono County) and along the east slope of the Sierra Nevada south to the type locality at Matlock Lake (Inyo County) (Vredenburg, et al, 2007.).

The yellow-legged frog is a moderate-sized frog (40.0-89.0 mm SVL). Individuals vary in color, and can be olive, yellowish or brown above, with varying amounts of black or brown markings. The frog has pale orange to yellow below and underneath the hind legs, indistinct dorsolateral folds, and does not possess a dark facemask. *R. sierrae* differs from *R. muscosa* by having relatively shorter legs and a significantly different mating call. The call is a short and rasping call often accelerated and rising at the end, sometimes pre-ceded by calls that don't rise at the end. The frog calls primarily underwater during the day, but may also call at night. The yellow-legged frog lacks vocal sacs.

R. sierra inhabits lakes, ponds, meadow streams, isolated pools, and sunny riverbanks in the Sierra Nevada Mountains. Open stream and lake edges with a gentle slope up to a depth of 5 to 8 cm seem to be preferred. Waters that do not freeze to the bottom and which do not dry up are required. If a body of water used for breeding dries up for just one season, 3 to 4 generations of tadpoles will be destroyed.

Mating and egg laying occurs in water shortly after the snows have melted and adults have emerged from hibernation, which can be any time from May to August. Adults tend to live around the breeding pond, so most do not need to travel to the breeding site. A cluster of 100 to 350 eggs is laid in shallow water and is left unattached in still waters, but may be attached to vegetation in flowing water. Egg-laying sites must be connected to permanent lakes or ponds that do not freeze to the bottom in winter, because the tadpoles overwinter, possibly taking as many as 3 or 4 summers before they transform.

2.5.3 Mount Lyell Salamander

The Mount Lyell salamander is designated as a California Species of Special Concern (and is one of three recognized species in the genus Hydromantes from California (Gorman 1988). The Mount Lyell salamander is a moderate-sized salamander (44.0-70.0 mm SVL), with a blotched rock-flake pattern resulting from flecks and patches of pale metallic gold, gray to whitish pigment on a brown to nearly black background color (Stebbins 1954b). Its feet are prominently webbed (Stebbins 1985), and the iris is bright yellow (Camp 1916).

Mount Lyell salamanders are endemic to California and their range extends from the Smith Lake area (El Dorado County) to the Franklin Pass area (Tulare County) in the Sierra Nevada Mountains (Jennings and Hayes 1994). An isolated population is present on the Sierra Buttes, Sierra County (Stebbins 1985). Its known elevational range extends from 1260 m to 3635 m.

Mount Lyell salamanders are nocturnal (Adams 1942) and adapted to cool conditions; they are known to be active between -2.0°C and 11.5°C (mean = 5.6°C; Brattstrom 1963), which is the lowest temperature range under which any species of *Hydromantes* is known to be voluntarily active (Gorman 1988) and may be the lowest known for any North American salamander. This species climbs by using its tail to move over the smooth, inclined surfaces of glacially polished rock, which is frequently encountered in their environment (Stebbins 1947). Mount Lyell salamanders are presumed to undergo direct development. Gorman (1956) examined an 11 egg-bearing female *H. platycephalus* and concluded that they lay fertilized, but undeveloped eggs. Mount Lyell salamander is insectivorous with hatchlings and juveniles apparently restricted to eating smaller forms, such as globular springtails (Sminthuridae) and fungus gnats (Mycetophilidae: Adams 1938, 1942). The season of near-surface activity ranges from around May 1 to late August, after which individuals probably retreat to refugia in talus slopes and fissures with sufficient moisture.

Mount Lyell salamanders are largely restricted to alpine or subalpine vegetation associations (Adams 1938, 1942; Stebbins 1951), although scattered records of this species exist from somewhat lower elevations. Extensive outcrops of rock and scattered boulders are characteristic of the habitat of this species (Stebbins 1985). Free surface water, such as a permanent stream, waterfall, seepage, or runoff from melting snow, is almost always present within a few meters, and usually within a few centimeters, of the sites where this species is present as it has been described as being no more resistance to water loss than wet paper (Gorman 1988). This high elevation endemic is most frequently found beneath rocks on a moist-to-wet substrate of rock and soil with little humus (Gorman 1988), on north and east slopes (Zeiner et al. 1988). Woody vegetation is typically sparse or absent altogether; but grasses, sedges, mosses, or lichens may be present.

3.1 RESULTS

3.2 <u>Vegetation Mapping</u>

GLA biologists identified 6 distinct vegetation community/land use types within the Project study area. Exhibit 7 provides a vegetation map for the site. Exhibit 8 provides representative site photographs. Table 3-1 provides a summary of vegetation acreages for the site.

Table 3-1. Summary of Vegetation Communities

Vegetation Community	Project Study Area
Scrub Communities	
Great Basin Sage Scrub	46.29
Woodland/Forest Communities	
Mixed Conifer Forest	37.32
Aspen Woodland	0.70
Riparian Communities	
Water Birch Riparian Woodland	36.34
Emergent Wetland	0.23
Disturbed	
Disturbed/Developed	25.83
Total	**149.71**

3.3 Noxious Weeds

During the vegetation mapping and focused survey for special-status plants, GLA noted all incidental observations of noxious weeds within the Project study area. In general, noxious weeds are not abundant within the Project study area and are primarily found along the access road to the north. One noxious weed, woolly mullein (*Verbascum thapsus*) was observed in three locations along the northern access road [Exhibit 7 and 8]. This species is listed as an invasive plant by the California Invasive Plant Council Exhibit (Cal-IPC) with a "Limited" inventory rating. Species with a "Limited" inventory rating are invasive but have ecological impacts that are minor on a statewide level or those where not enough information was available to justify a higher score. Their reproductive biology and other attributes result in low to moderate rates of invasiveness. Ecological amplitude and distribution are generally limited, but this species may be locally persistent and problematic. According to Cal-IPC, woolly mullein is a biennial or annual forb (family Scrophulariaceae) that occurs throughout California, but is particularly abundant in dry valleys on the eastern side of the Sierra Nevada. High population densities have been observed in moist meadows and creek drainages near Mono Lake and Owens Valley.

3.4 Special-Status Plants

No special-status plants were detected within the Project study area.

3.5 Sierra Nevada Bighorn Sheep

As noted above in Section 2.2.1 of this report, portions of the Proposed Project occur within USFWS-designated Critical Habitat for the Wheeler Ridge Herd, which is part of the SNBS Central Recovery Unit [Exhibit 6]. The boundary of the Wheeler Ridge Unit depicted in Exhibit 6 is a representation of the outer limits of recorded points from 2001 – 2012. Historically, SNBS have always occupied the Sierra Nevada mountain range, including the area encompassing the Wheeler Ridge Unit. However, SNBS were not detected within the Wheeler Ridge Unit prior to the first reintroduction of nine SNBS in 1979 (K. Knox, personal communication, October 5, 2012). Subsequent SNBS translocations into the Wheeler Ridge Unit included 10 sheep in 1980, four sheep in 1982, and four sheep in 1986 (Ramey and Brown 1986, K. Knox, personal communication, November 15, 2012). Since the last reintroduction of SNBS in 1986, the Wheeler Ridge Herd included 13 ewes in 1991. Since 2001, the Wheeler Ridge Unit is currently one of four units intended to serve as source population for reintroductions into other SNBS units (CDFW 2012).

As of winter 2010-2011, the Wheeler Ridge and Mount Langley herd units combined account for approximately half of the total SNBS population of approximately 400 animals (CDFW 2012). The Wheeler Ridge herd unit reached peak size in 2007 and as of the winter of 2010-2011, its population is reported to have been experiencing a clear decrease over time (CDFW 2012). Multiple attempts to survey the Wheeler Ridge Unit were made by CDFW in the winter of 2011-12. As of April 14, 2012, CDFW estimated that the Wheeler Ridge population consists of a total of 81 animals, including 31 adult females, 4 yearling females, 15 lambs, 31 adult males, and 5 yearling males. According to Alexandra Few (personal communication, November 26, 2012) of CDFW, "this estimate is a compilation of repeated group observations over several months and may be a significant underestimate of this population."

According to CDFW, lambing can occur as early as April 15^{th} and can proceed well into July. Most ewes give birth in May or June. A significant number of ewes lamb each year in the red rock above the tailing ponds in Pine Creek Canyon (A. Few, personal communication, November 26, 2012).

The majority of detections within study area occurred in the spring (March, April, and May), and late fall (November). No detections occurred within the study during the summer months (June through September). Exhibit 9 depicts the project study area against the annual SNBS detections, and demonstrates that the actual occurrence of SNBS on the Proposed Proposed Project is extremely small in comparison with the overall occurrence of SNBS within the Wheeler Ridge Unit.

As noted above in Section 2.2 of this report, some GPS collars (depending on the model used) are programmed to record detections from one to three or more times a day. As such, several detections may represent one collared animal recorded multiple times on the same day. Conversely, one detection point does not identify the number of sheep accompanying the collared individual, and because SNBS are gregarious, it can be inferred that a detection point generally indicates the location of more than one animal. For example, GLA detected a group of 18 SNBS (including 11 ewes and seven lambs) on September 24, 2012 along a turnout of Pine Creek Road approximately one kilometer (0.6 miles) east of the Pine Creek Mine facilities, which according to CDFW is an area that is used consistently by SNBS (K. Knox, personal communication, November 15, 2012). Of the 18 SNBS detected, only one of the ewes was collared. Therefore, the CDFW data provides a good representation of the relative size of the Wheeler Ridge Unit relative the SNBS usage of the Proposed Project, and the trends in population increases and decreases, but is not sufficient to determine the exact population size.

3.6 Bats

Various bat species have been documented within the Sierra and Inyo-White Mountain ranges and have some potential to occur on site, including the Mexican free-tailed bat (*Tadarida brasilensis*), pallid bat (*Antrozous pallidus*), Townsends's big-eared bat (*Corynorhinus townsendii*), spotted bat (*Euderma maculatum*), silver-haired bat (*Lasionycteris noctivagans*), hoary bat (*Lasiurus cinereus*), western pipistrelle (*Parastrellus hesperus*), big brown bat (*Eptesicus fuscus*), California myotis (*Myotis californica*), western small-footed myotis (*Myotis ciliolabrum*), long-eared myotis (*Myotis evotis*), little brown bat (*Myotis lucifugus*), long-legged myotis (*Myotis volans*), and Yuma myotis (*Myotis yumanensis*) (Szewczak et al, 1998). None of these species are Federally or State listed, although several are designated as California Species of Special Concern. Others are given a medium to high priority by the Western Bat Working Group, but are not recognized by the State as sensitive. In general, bat habitats in the region include rock outcrops, crevices in cliff faces, caves, mines, trees, buildings, tunnels, bridges, etc.

During the August 21, 2011 and June 1, 2012 summer out-flight surveys at the Proposed Project, echolocation signals of several bat species were recorded at the Main Portal and Easy-Go adit, including those of big brown bat, Yuma myotis or California myotis, and little brown bat or long-legged myotis. Echolocation signals of spotted bat were also recorded in the yard adjacent to the portals. During the August 21, 2011 survey, four bats were observed exiting the mine and two were observed entering the mine. During the June 1, 2012 survey, a single bat was observed exiting the mine. It is likely that these resident bats are male bats roosting in a side drift of the mine, where ambient temperatures are higher than that of the major portals. The low number of resident bats detected suggests a very low potential for a maternity colony to occur within the mine.

During the January 2, 2012 and February 16, 2012 winter surveys at the Proposed Project, no bats were detected within the mine. It was also noted during 2012 winter surveys that temperatures within the mine were not cool enough to support hibernating bats. During the June 2, July 11, August 7, and September 24, 2012 surveys conducted within the mine, no bats or bat sign were observed. Dr. Brown's memoranda documenting the focused surveys are included in this document as Appendix C.

3.7 Amphibians

A review of the CNDDB, CDFW HML data (J. Erdman, personal communication), and other sources revealed no records of the Yosemite toad and Sierra Nevada yellow-legged frog within and immediately adjacent to the Proposed Project. A review of the CNDDB and Fichtel (2004) show that the Mount Lyell salamander had been detected under rocks with damp soil along a tributary to Pine Creek, south of the Proposed Project within Pine Creek Canyon in 2002 and 2004. No amphibian species, including the Yosemite toad, Sierra Nevada yellow-legged frog, Mount Lyell salamander or any auran or salamander species were detected during the field investigations. GLA biologists also did not detect any egg masses or tadpoles.

The portions of Morgan Creek and Pine Creek within the Project study area are generally not considered suitable habitat to support breeding amphibians. Both creeks have steep gradients, and the force of water flowing through the creeks generally does not provide for ponds and areas of slow-moving water to support breeding, including a stable environment to sustain egg masses. In addition, aquatic predation (including non-native fish) further inhibits the establishment of breeding populations. The perennially flowing portion of Morgan Creek occurs from the discharge point from the mine to the confluence with Pine Creek. The force of water in this portion of the creek does not support amphibian activity.

The area immediately above the confluence of Morgan Creek and Pine Creek does exhibit area of slower moving water at times, and is vegetated with patches of wet meadow and emergent vegetation. This area would represent the best opportunity for amphibians, though no amphibians were detected within this area during focused surveys. Furthermore, the Proposed Project will not affect the area above the confluence of the creeks.

The man-made ponds located within the footprint of the mine property do not support vegetation to allow for the attachment of egg masses. Furthermore, no egg masses, tadpoles, or adult amphibians were detected in or around the ponds during the biological surveys.

4.1 IMPACT ANALYSIS

The following discussion examines the potential impacts to special-status plant and wildlife resources, and the potential for the spread of noxious weeds, that would occur as a result of the Proposed Project. Impacts (or effects) can occur in two forms, direct and indirect. Direct impacts are considered to be those that involve the loss, modification or disturbance of plant communities, which in turn, directly affect the flora and fauna of those habitats. Direct impacts also include the destruction of individual plants or animals, which may also directly affect regional population numbers of a species or result in the physical isolation of populations thereby reducing genetic diversity and population stability.

Indirect impacts pertain to those impacts that result in a change to the physical environment, but which is not immediately related to a project. Indirect (or secondary) impacts are those that are reasonably foreseeable and caused by a project, but occur at a different time or place. Indirect impacts can occur at the urban/wildland interface of projects, to biological resources located downstream from projects, and other off site areas where the effects of the project may be experienced by plants and wildlife. Examples of indirect impacts include the effects of increases in ambient levels of noise or light; predation by domestic pets; competition with exotic plants and animals; spread of noxious weeds; introduction of toxics, including pesticides; and other human disturbances such as hiking, off-road vehicle use, unauthorized dumping, etc. Indirect impacts are often attributed to the subsequent day-to-day activities associated with project build-out, such as increased noise, the use of artificial light sources, and invasive ornamental plantings that may encroach into native areas. Indirect effects may be both short-term and long-term in their duration. These impacts are commonly referred to as “edge effects” and may result in a slow replacement of native plants by non-native invasives, as well as changes in the behavioral patterns of wildlife and reduced wildlife diversity and abundance in habitats adjacent to Proposed Projects.

Cumulative impacts refers to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. A cumulative impact can occur from multiple individual effects from the same project, or from several projects. The cumulative impact from several projects is the change in the environment resulting from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.

4.2 Potential Impacts of the Proposed Project

Potential impacts as a result of the Proposed Project are divided between those that may occur as a result of the construction/installation of electricity-generating facilities within the mine, and those that may occur as a result of the long-term operation of the new facilities. Construction-related activities evaluated for potential direct impacts would include vehicle trips to transport materials and/or equipment to the site, the staging of equipment/materials outside of the mine portals, vehicle trips to the site, and the potential for erosion as a result of these activities. Potential indirect effects from construction would include lighting, noise, and hazardous materials generated by the activities that may affect adjacent native habitats and species, including Morgan Creek, Pine Creek, and surrounding uplands.

Potential long-term impacts from the Proposed Project include potential hydrologic effects from the control of water discharges from the mine plug. The current average rate of discharge from the mine into Morgan Creek is approximately seven cfs. Operation of the new facilities will generate an average discharge of rate of 10 cfs. The proposed minor modification of discharge rate is not expected to adversely affect the hydrologic regime of Morgan Creek and Pine Creek. Additional potential long-term factors include vehicle trips to the mine, and noise/lighting generated by operation of the mine facilities. However, there is not expected to be a significant (if any) increase in the level of activity at the mine (including vehicle trips) compared with the existing operation of the site.

Potential impacts as a result of the above-mentioned factors are discussed below for native botanical resources, Sierra Nevada bighorn sheep, special-status bats, and special-status amphibians.

4.3 Vegetation Communities, Noxious Weeds and Special-Status Plants

The Proposed Project is not expected to have any direct or indirect adverse effects on native vegetation. Native vegetation communities will not be directly or indirectly impacted as a result of construction and long-term operation of the proposed facilities. Access to the site will occur via existing roads and other disturbed access points. The staging of equipment/materials will occur within the existing disturbed/developed footprint of the mine property. The daily modification of discharge rates is not expected to deprive water to downstream wetland/riparian resources within Morgan Creek and Pine Creek, or adversely increase the amount and velocity of water to the creeks that could result in adverse erosion/sedimentation, and potential type conversion of native habitat types. The best management practices described above in Section

1.2.4 will minimize the potential for any direct or indirect adverse effects on native vegetation due to soil erosion.

The Proposed Project is not expected to cause the spread of noxious weeds into native vegetation communities. The woolly mullein occurs in extremely limited quantity within the Project study area and the Proposed Project will not result in new surface impacts. There is not expected to be a significant (if any) increase in the level of activity at the mine (including vehicle trips along the access road where the woolly mullein was observed) compared with the existing operation of the site.

The Proposed Project is not expected to have any direct or indirect adverse effects on special-status plants. No special-status plants were detected within the Project study area during biological surveys. The Proposed Project will not directly impact any areas with the potential to support special-status plants, and adverse hydrologic effects Morgan Creek and Pine Creek are not anticipated due to the daily modification of discharge rates.

4.3 Sierra Nevada Bighorn Sheep

The Proposed Project is not anticipated to have and adverse direct, indirect, or cumulative impacts on SNBS. Construction and long-term operation of the Project facilities will not directly impact any areas utilized by SNBS. With the exception of any temporary staging within the existing disturbed footprint of the mine property, all construction will occur within the mine itself, which is not utilized by SNBS. A temporary increase in vehicle trips may occur to transport materials to the site; however, this increase would be minimal and is not expected to adversely affect SNBS.

The Proposed Project will not result in adverse indirect effects to SNBS. Aspects of the Project that would be considered for indirect effects include any increase in ambient lighting or noise that may affect adjacent SNBS habitat, and any potential hydrologic effects as a result of proposed modified water discharges from the mine. The Pine Creek Mine currently employs a staff that lives onsite with their families. The staff will be involved with the installation of the proposed facilities, and will be responsible for the long-term operation and maintenance of the new facilities. As such, an increase in human presence is not anticipated that would adversely affect SNBS. The mine property contains several operational buildings, as well as a private residence for the mine staff, including existing lighting. The Proposed Project will not result in an increase in lighting. A temporary increase in noise levels may occur during the installation of new facilities; however this is not expected to significantly raise noise levels that would adversely affect SNBS. An increase in noise levels outside of the mine is not anticipated as a result of the long-term operation of the new facilities. The modification of discharge from the mine is also not expected to adversely affect SNBS. The daily modification of flows into Morgan Creek and Pine Creek will not affect water sources utilized by SNBS, and will impact SNBS habitat.

4.4 Bats

The Proposed Project is not anticipated to have any adverse direct, indirect, or cumulative impacts on bats, including special-status bat species. Though a small number of bats were detected outside of the mine, or entering/existing the mine, the low number of resident bats detected suggests a very low potential for a maternity colony to occur within the mine. As noted above, it is likely that these resident bats are male bats roosting in a side drift of the mine, where ambient temperatures are higher than that of the major portals.

4.5 Amphibians

The Proposed Project is not anticipated to have any adverse direct, indirect, or cumulative impacts on amphibians, including special-status species. Conditions observed within Pine Creek and Morgan Creek indicate a very low potential for amphibians to breed within the Project study area. Furthermore, as discussed above, the proposed modification of discharge rates is not expected to adversely affect the hydrologic regime of Morgan Creek and Pine Creek.

The best management practices described above in Section 1.2.4 will minimize the potential for any direct or indirect adverse effects on amphibians due to soil erosion.

5.0 CONCLUSION

In conclusion, the Proposed Project is not expected to have any direct, indirect, or cumulative impacts to special-status species, including special-status plants, the Sierra Nevada bighorn sheep (SNBS), Yosemite toad, Sierra Nevada yellow-legged frog, Mount Lyell salamander, or special-status bats. Of the species evaluated for the Project, only the SNBS has been documented at or immediately adjacent to the Proposed Project. The Proposed Project is also not expected to result in the spread of noxious weeds.

As discussed above, the existing Pine Creek Mine property had been under operation for 84 years (1916 – 2000). The property contains existing facilities, including private residences that are occupied by staff (and their families) that maintain the mine, will be involved in the construction of proposed facilities within the mine, and will continue to operate and maintain the new facilities. As such, there will be no significant (if any) change in activities between current and proposed operations as it applies to noise, lighting, and other factors that would have the potential to affect SNBS and other species. The only measurable change to site conditions as a result of the Proposed Project will be a daily modification of water discharges from the mine. However, although there will be a greater fluctuation of water throughout each day in order to hold/release more water timed with peak electricity generation periods, the daily average and volume of water discharged from the mine will not significantly change compared with existing conditions. As such, there will be no expected adverse effects to Pine Creek and Morgan Creek, including the associated habitats and plant/animals resources.

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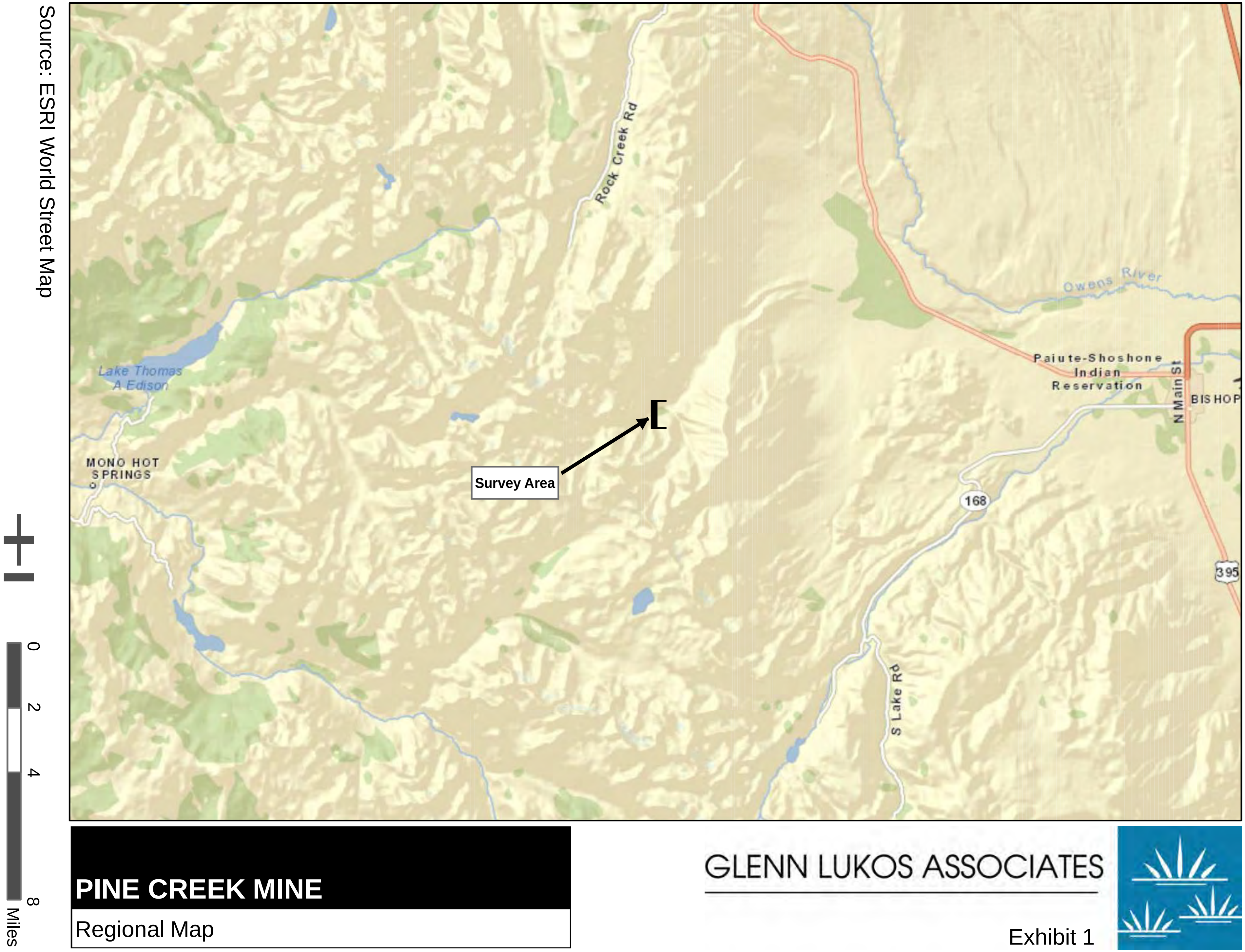
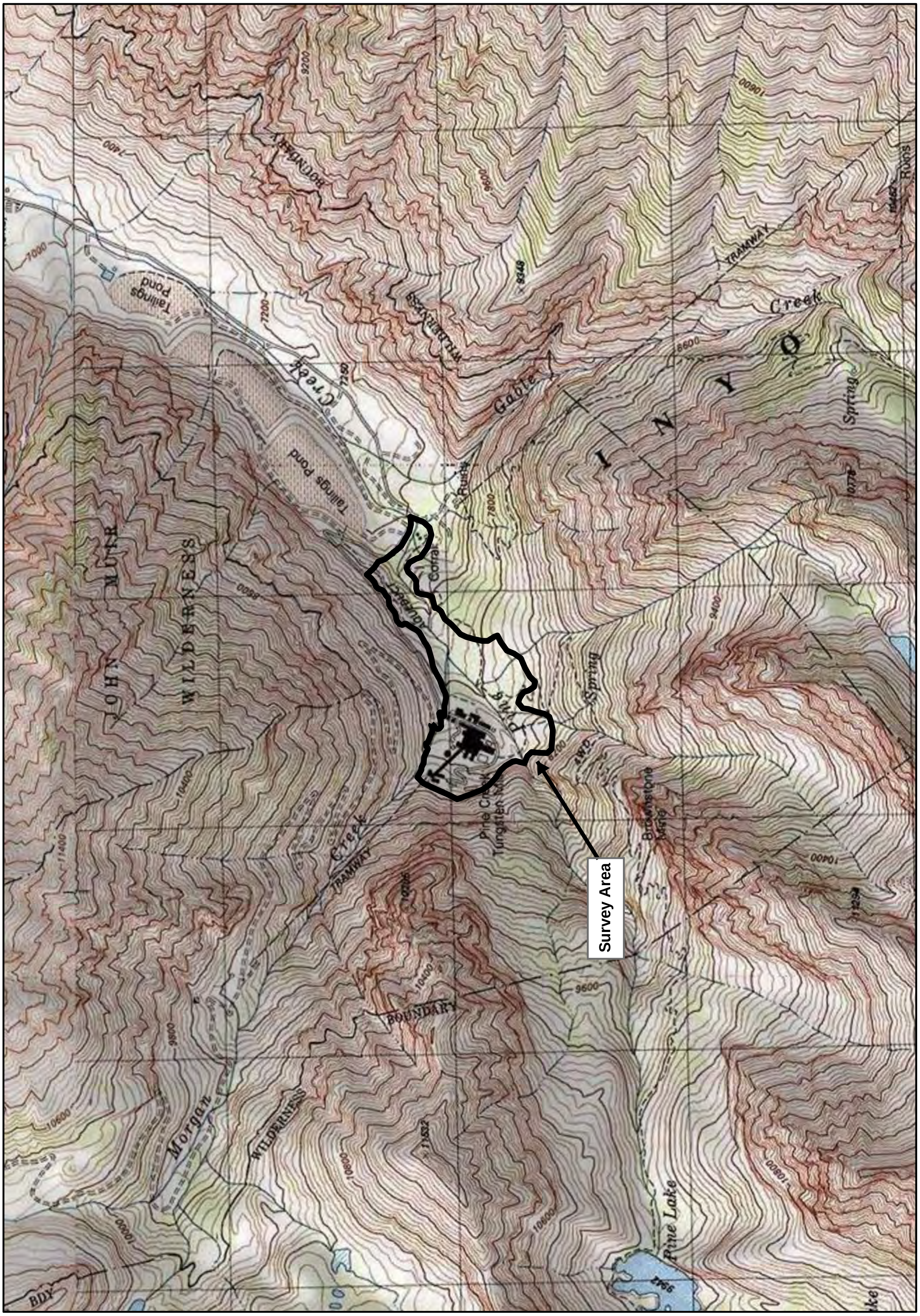


PINE CREEK MINE

Regional Map

GLENN LUKOS ASSOCIATES

Exhibit 1



GLENN LUKOS ASSOCIATES

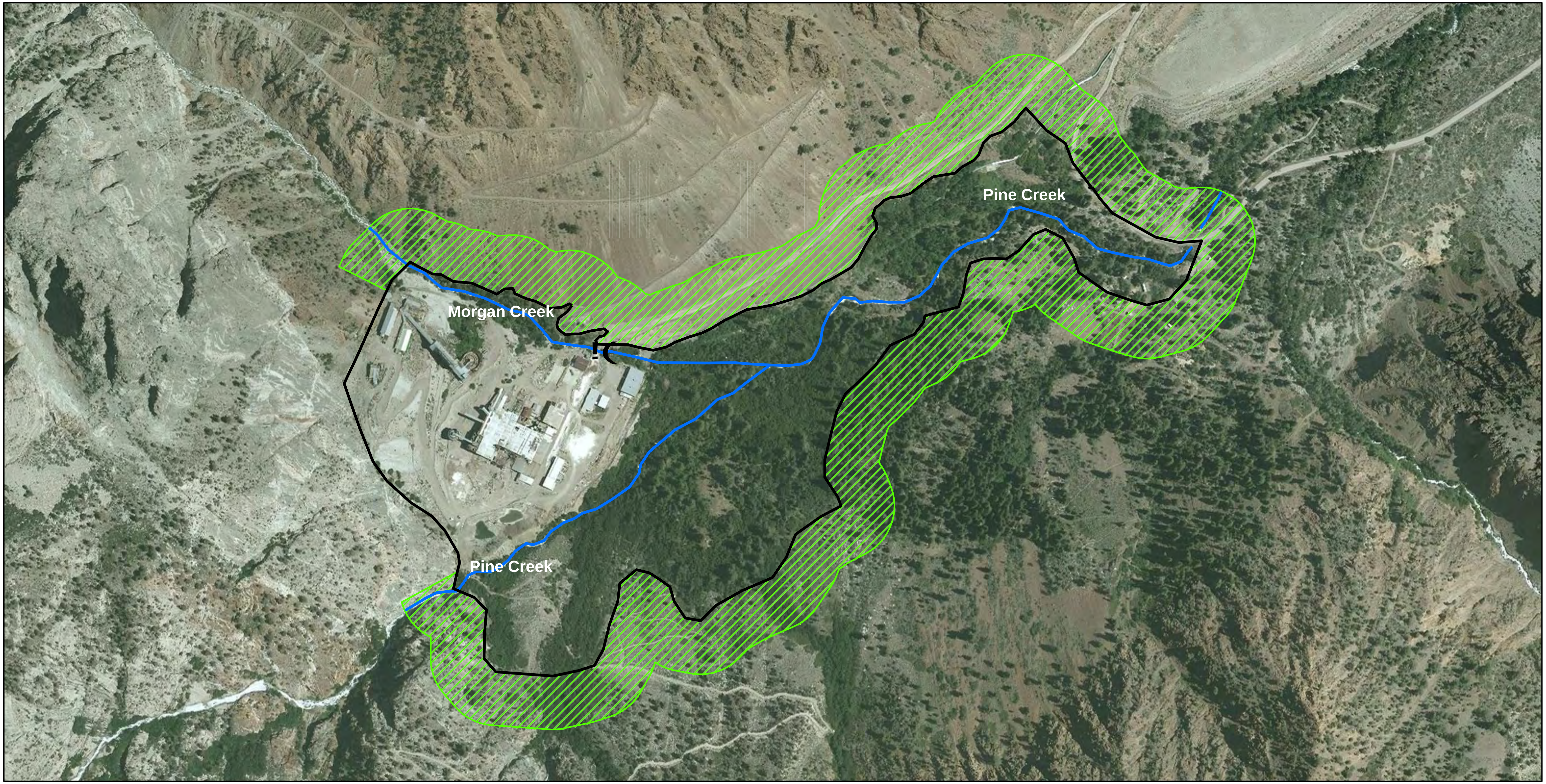
Exhibit 2

PINE CREEK MINE

Vicinity Map

Adapted from USGS Mount Tom, CA quadrangle

0 1,000 2,000 4,000 Feet



Legend

- Pine Creek Mine Survey Area
- 250-Foot Riparian Buffer Survey Area
- !(Approximate Discharge Point
- Jurisdictional Streams

0 225 450 900
Feet

PINE CREEK MINE

Biological Study Area

GLENN LUKOS ASSOCIATES

Exhibit 3

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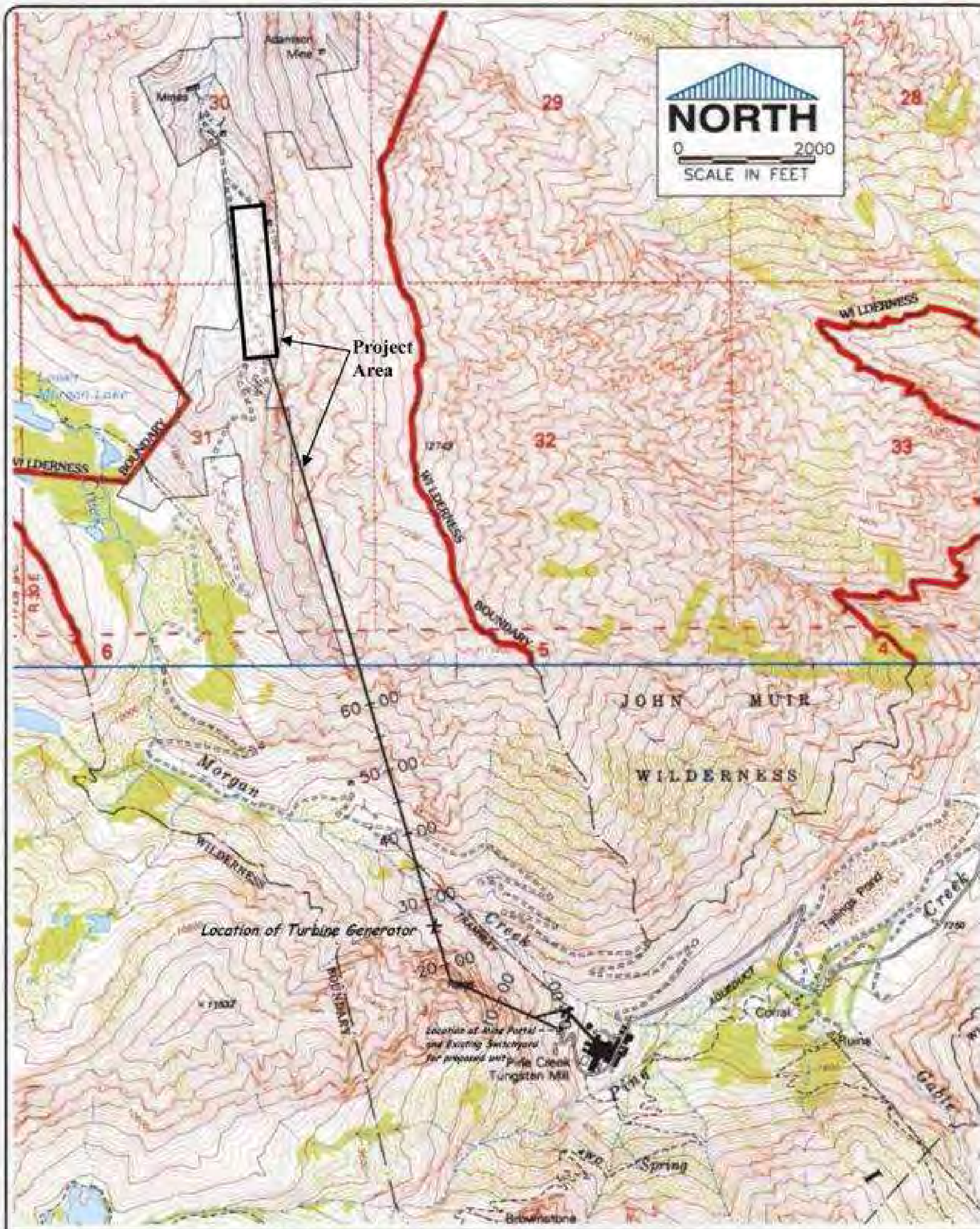
June 15, 2012



Pine Creek Mine
Hydroelectric Project

Exhibit 4

Job No.	SITE PLAN
Date	EASY–GO TUNNEL
Scale	PINE CREEK MINE SITE
Drawn / Chk'd	BISHOP, CALIFORNIA

File No.

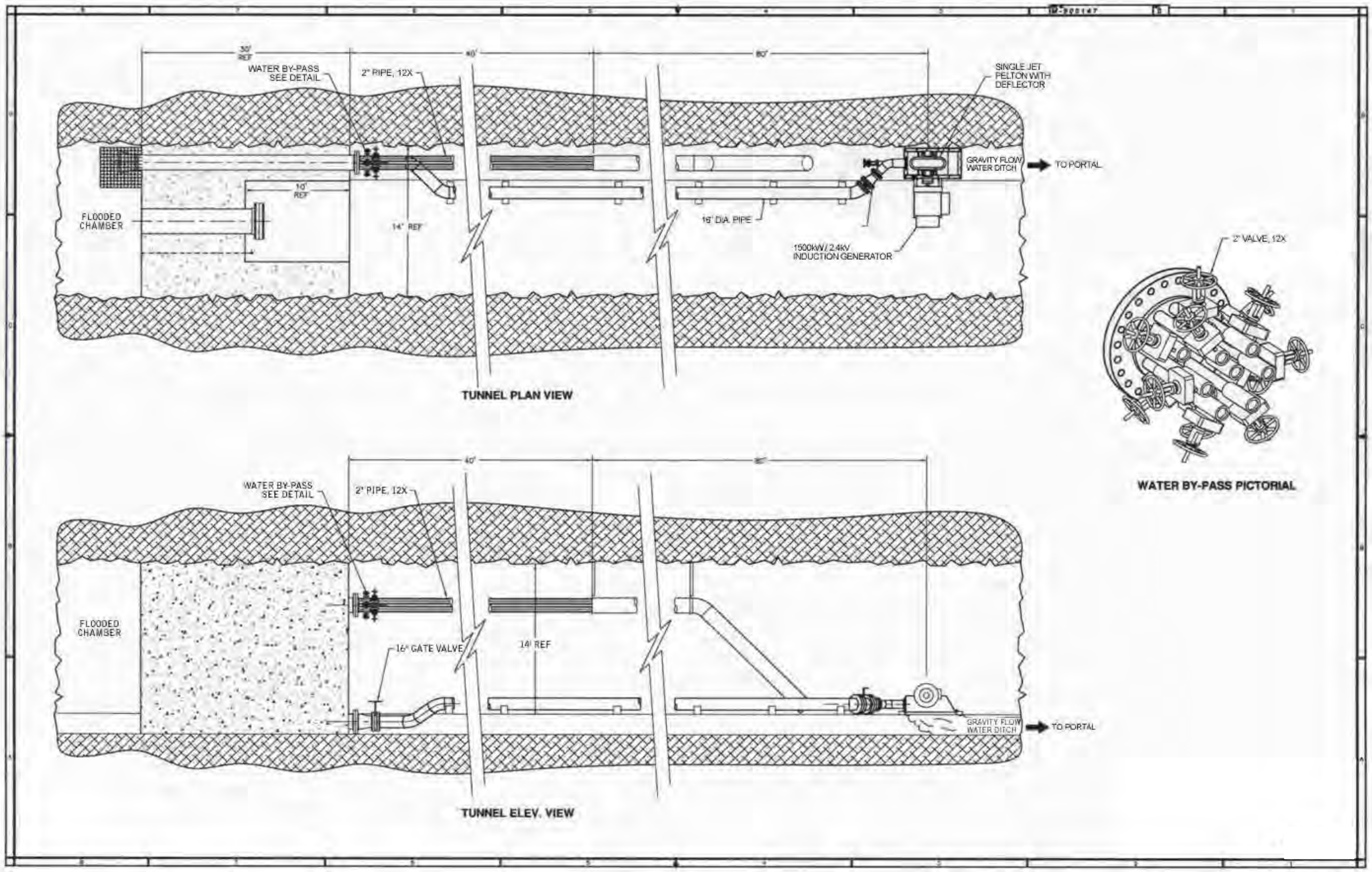
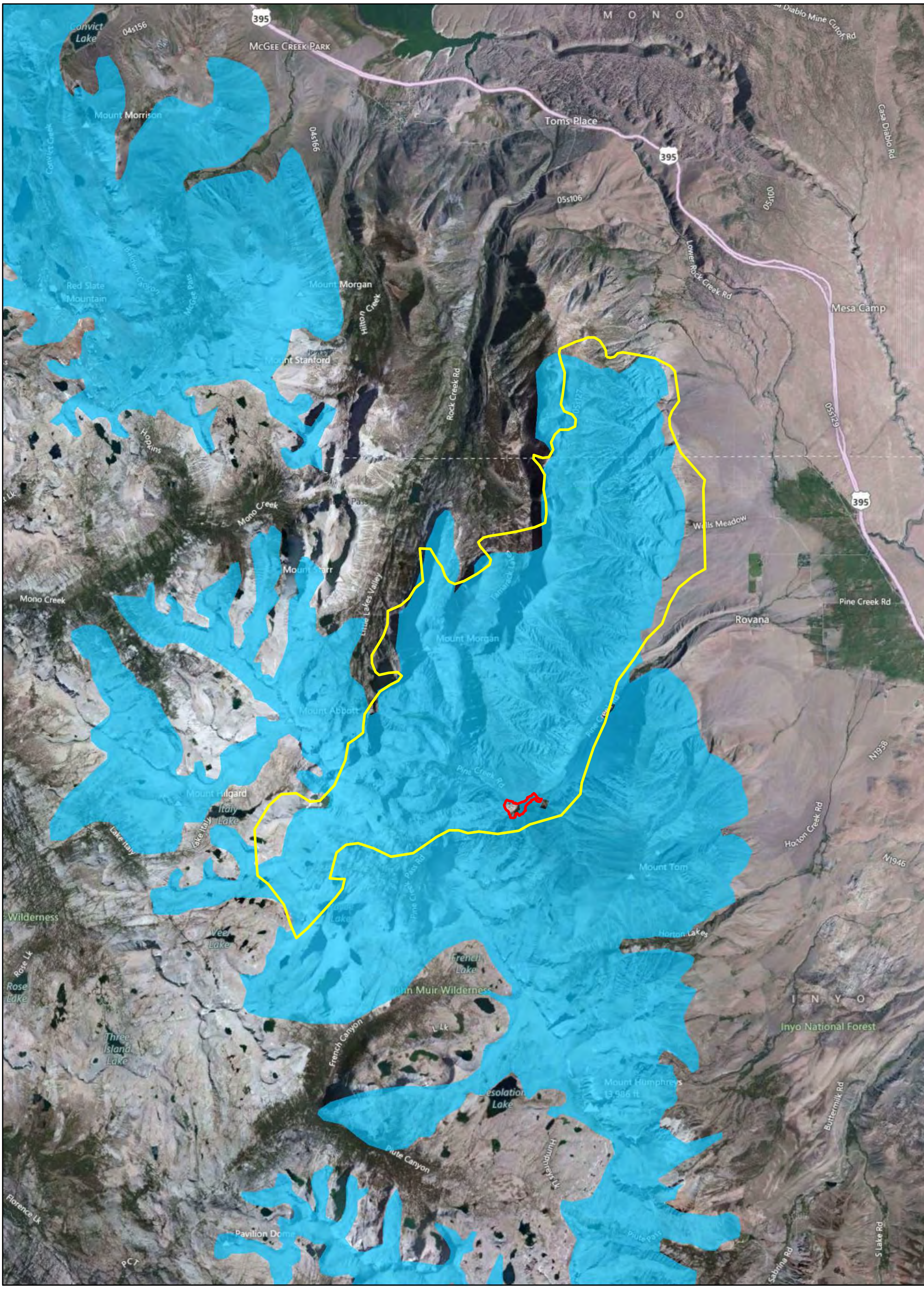


Exhibit 5: **Existing Mine Plug and Proposed Project Penstock and Turbine Unit, Pine Creek Mine Site**



Source: CDFW, 2012

Legend

- Pine Creek Mine Survey Area
- SNBS Critical Habitat
- Boundary of Wheeler Ridge Unit Detections from 2001-2012

0 5,000 10,000 20,000
Feet

PINE CREEK MINE

Critical Habitat & Wheeler Ridge Herd Unit

GLENN LUKOS ASSOCIATES

Exhibit 6

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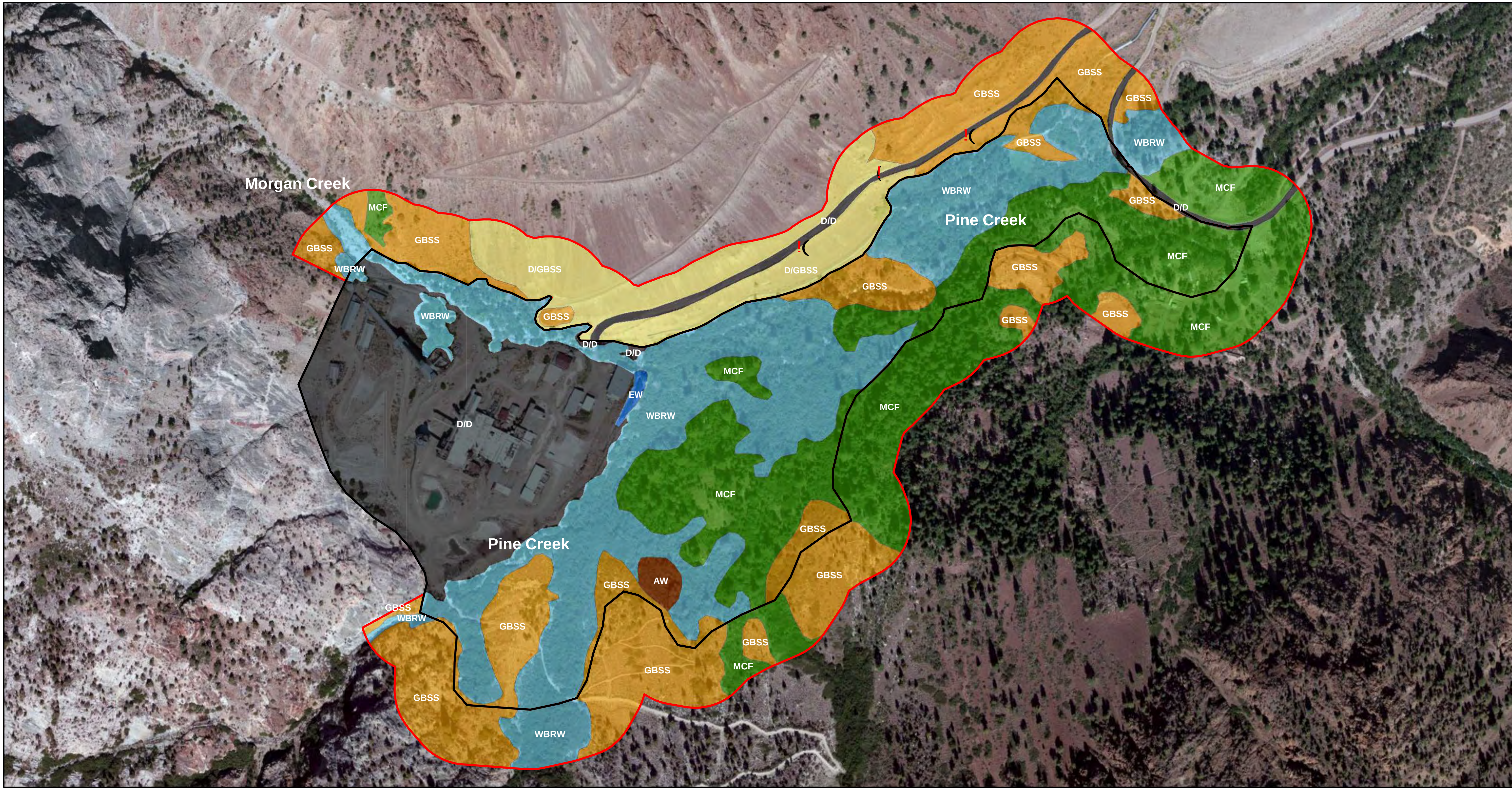
February 266, 2013



Legend

- Pine Creek Mine Survey Area
- 250-Foot Riparian Buffer Survey Area
- AW - Aspen Woodland
- D/D - Disturbed/Developed
- D/GBSS - Disturbed/Great Basin Sage Scrub
- EW - Emergent Wetland
- GBSS - Great Basin Sage Scrub
- MCF - Mixed Conifer Forest
- WBRW - Water Birch Riparian Woodland
- !(Verbascum thapsus

0 200 400 800
Feet

PINE CREEK MINE

Vegetation Map

GLENN LUKOS ASSOCIATES

Exhibit 7

X:\00 - 0362 ONLY\0328-02FERC\328-2GIS\VegetationGIS\328-2Vegetation.mxd
November 14, 2012

Photograph 1: View looking west at Pine Creek Mine facilities in the background. Photograph taken June 1, 2012.

Photograph 2: View looking south at Pine Creek Mine facilities including maintenance area (left) and housing (right). Photograph taken June 1, 2012.

Photograph 3: View depicting a man-made pond and maintenance facilities (background). Photograph taken June 1, 2012.

Photograph 4: View depicting main access road to the entrance of the Mine tunnel (upper left of photograph). Morgan Creek is depicted by riparian vegetation in background). Photograph taken June 1, 2012.

GLENN LUKOS ASSOCIATES

Exhibit 8

PINE CREEK MINE

Site Photographs

Photograph 5: View looking at the entrance to the Maintenance Portal that connects to the Mine tunnel. Photograph taken June 1, 2012.

Photograph 6: View depicting the interior of the Mine tunnel. Photograph taken September 24, 2012.

Photograph 7: View depicting the plug entrance (opened) within the Mine tunnel. Photograph taken July 10, 2012.

Photograph 8: View depicting water exiting a pipe immediately adjacent to the plug entrance within the Mine tunnel. Photograph taken June 1, 2012.

GLENN LUKOS ASSOCIATES

Exhibit 8

PINE CREEK MINE

Site Photographs

Photograph 9: View looking at a man-made pond located in the southwestern portion of the Study Area. Note the absence of emergent vegetation. Photograph taken September 24, 2012.

Photograph 10: View looking at a man-made pond located in southwestern portion of Study Area, north of Pine Creek. Note the absence of emergent vegetation. Photograph taken September 24, 2012.

Photograph 11: View looking at a man-made pond located immediately below the pond depicted in Photograph 10. Note the absence of emergent vegetation. Photograph taken September 24, 2012.

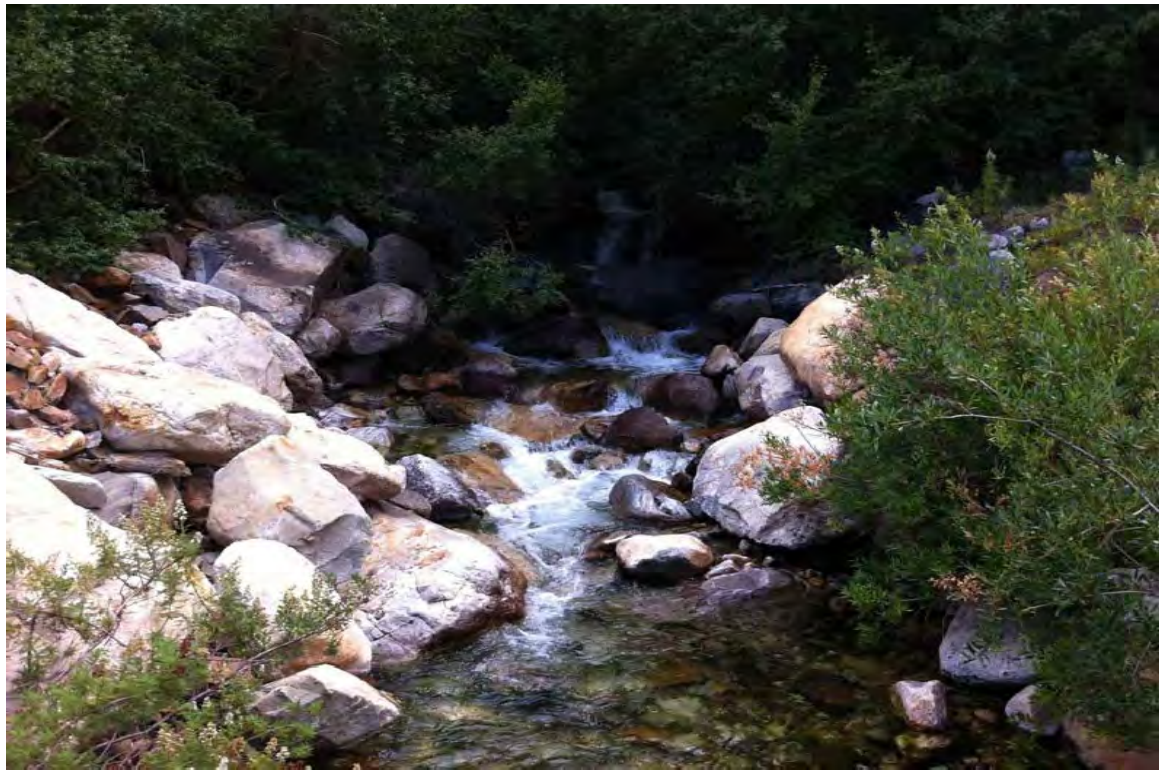
Photograph 12: View looking at a man-made pond located adjacent to the staff quarters immediately above Morgan Creek. Note the absence of emergent vegetation. Photograph taken June 1, 2012.

GLENN LUKOS ASSOCIATES

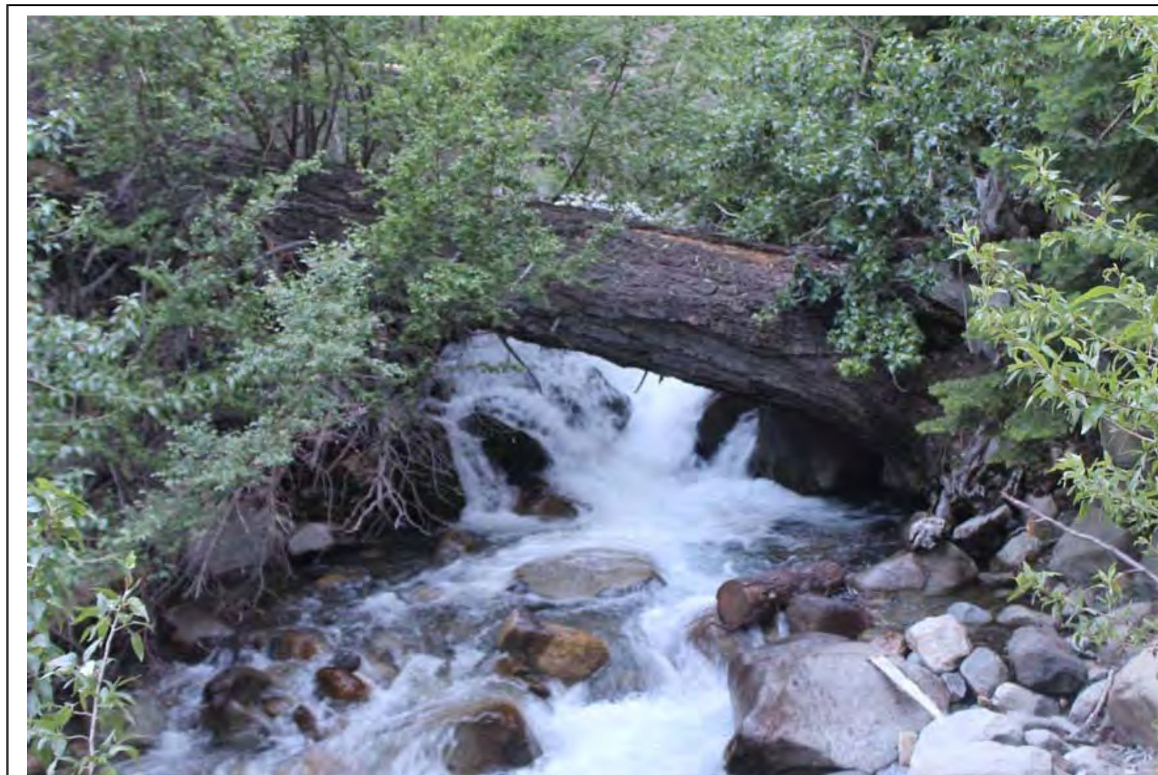
Exhibit 8

PINE CREEK MINE

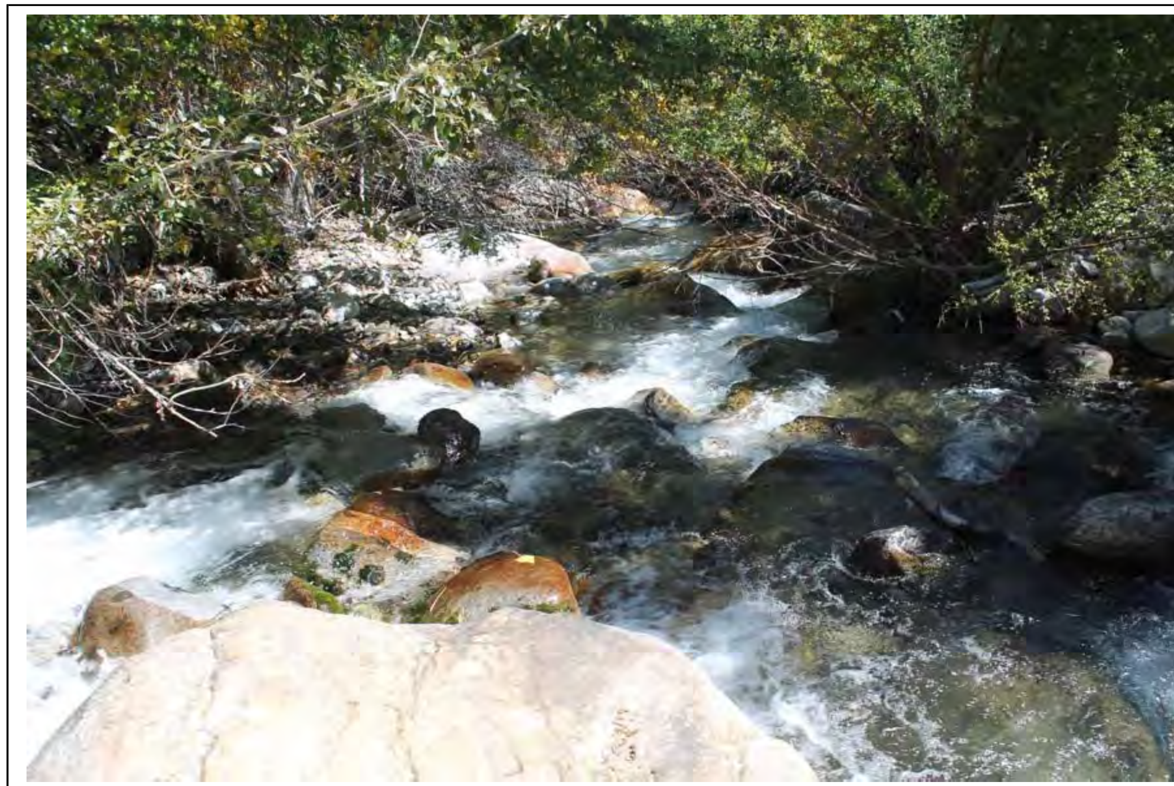
Site Photographs



Photograph 13: View looking at upper limit of Pine Creek within Study Area. Photograph taken August 7, 2012.



Photograph 14: View looking at Pine Creek, below the confluence with Morgan Creek. Photograph taken July 10, 2012.



Photograph 15: View looking at confluence of Morgan Creek (left) and Pine Creek (right). Photograph taken September 24, 2012.

Photograph 16: View looking at Pine Creek above main entrance gate (Pine Creek Road) and below the confluence with Morgan Creek. Photograph taken July 10, 2012.

GLENN LUKOS ASSOCIATES

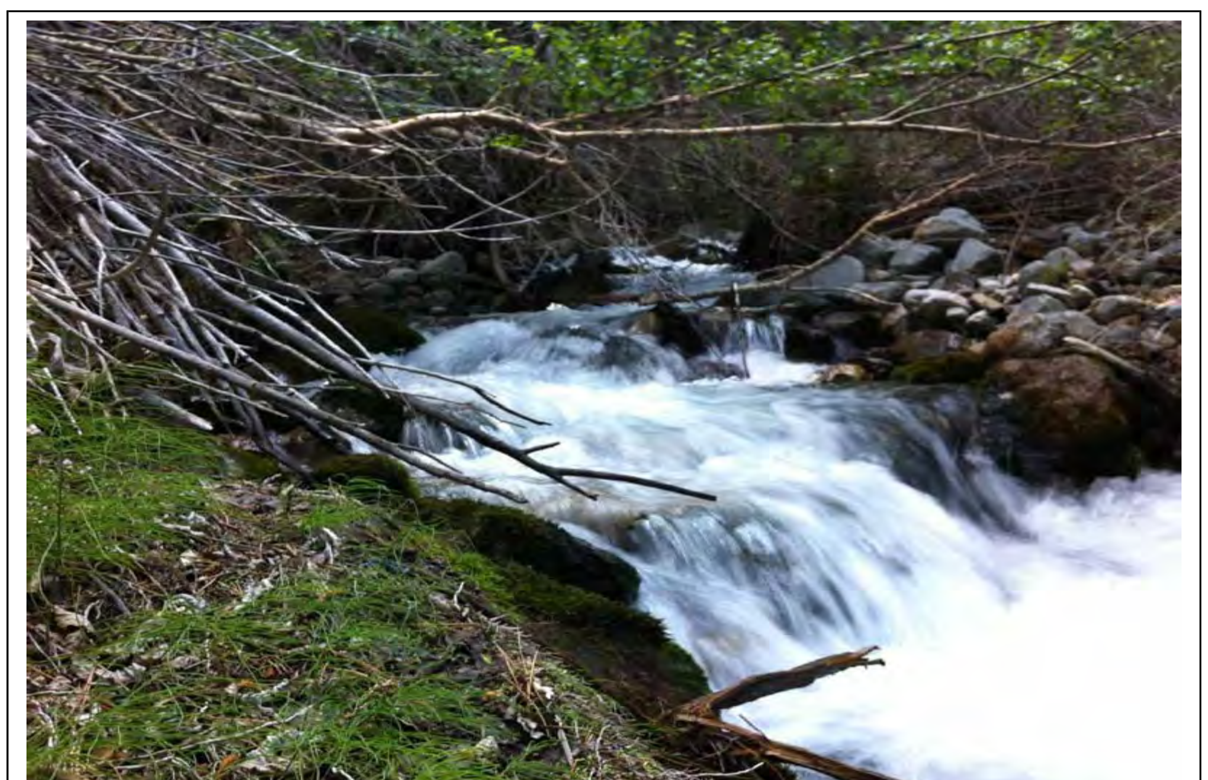
Exhibit 8

PINE CREEK MINE

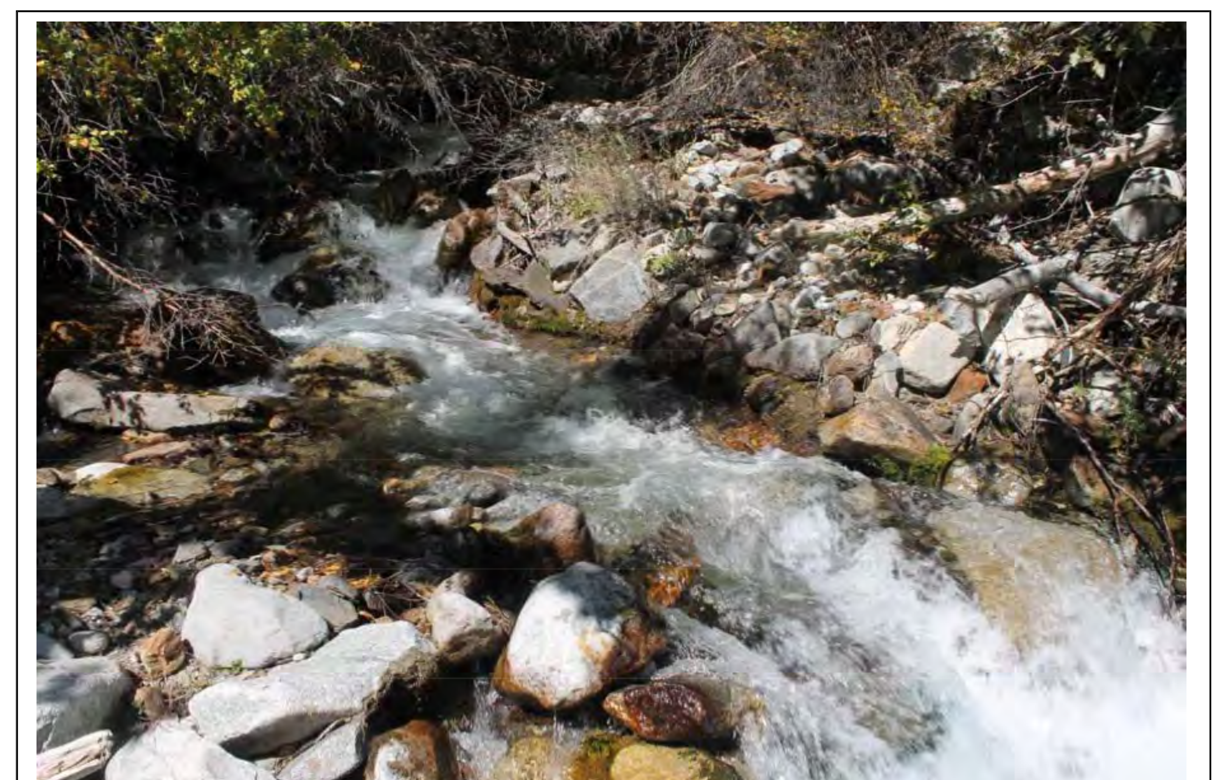
Site Photographs

Photograph 17: View of Morgan Creek flowing (center) above the main entrance bridge to Pine Creek Mine. Water falling from the waterfalls (left) exits the Mine tunnel, and travels through man-made ponds before entering Morgan Creek. Photograph taken June 1, 2012.

Photograph 18: View of Morgan Creek above the main entrance bridge to Pine Creek Mine. Photograph taken June 1, 2012.



Photograph 19: View looking at Morgan Creek, above the confluence with Pine Creek. Photograph taken August 7, 2012.



Photograph 20: View of Morgan Creek immediately above the confluence with Pine Creek. Photo taken September 24, 2012.

GLENN LUKOS ASSOCIATES

Exhibit 8

PINE CREEK MINE

Site Photographs

Photograph 21: View looking at small man-made pool connected to Morgan Creek that was surveyed at night for amphibians. Photograph taken July 10, 2012.

Photograph 22: View depicting an area surveyed for amphibians. Photograph taken July 10, 2012.

GLENN LUKOS ASSOCIATES

Exhibit 8

Photograph 23: Photo of woolly mullein (*Verbascum Thapsus*) along edge of northern access road. Photo taken July 10, 2012.

Photograph 24: View looking at rubber boa (*Charina bottae*) detected under plywood board depicted in Photograph 23. Photograph taken August 7, 2012. A heather vole (*Phenacomys intermedius*) was also detected under same board on June 1, 2012.

PINE CREEK MINE

Site Photographs

Photograph 25: View looking at SNBS herd immediately northeast of Pine Creek Road. Photograph taken September 24, 2012.

Photograph 26: View looking at SNBS herd climbing above (north of) Pine Creek Road. Photograph taken September 24, 2012.

Photograph 27: View looking at SNBS herd climbing above Pine Creek Road. Photograph taken September 24, 2012.

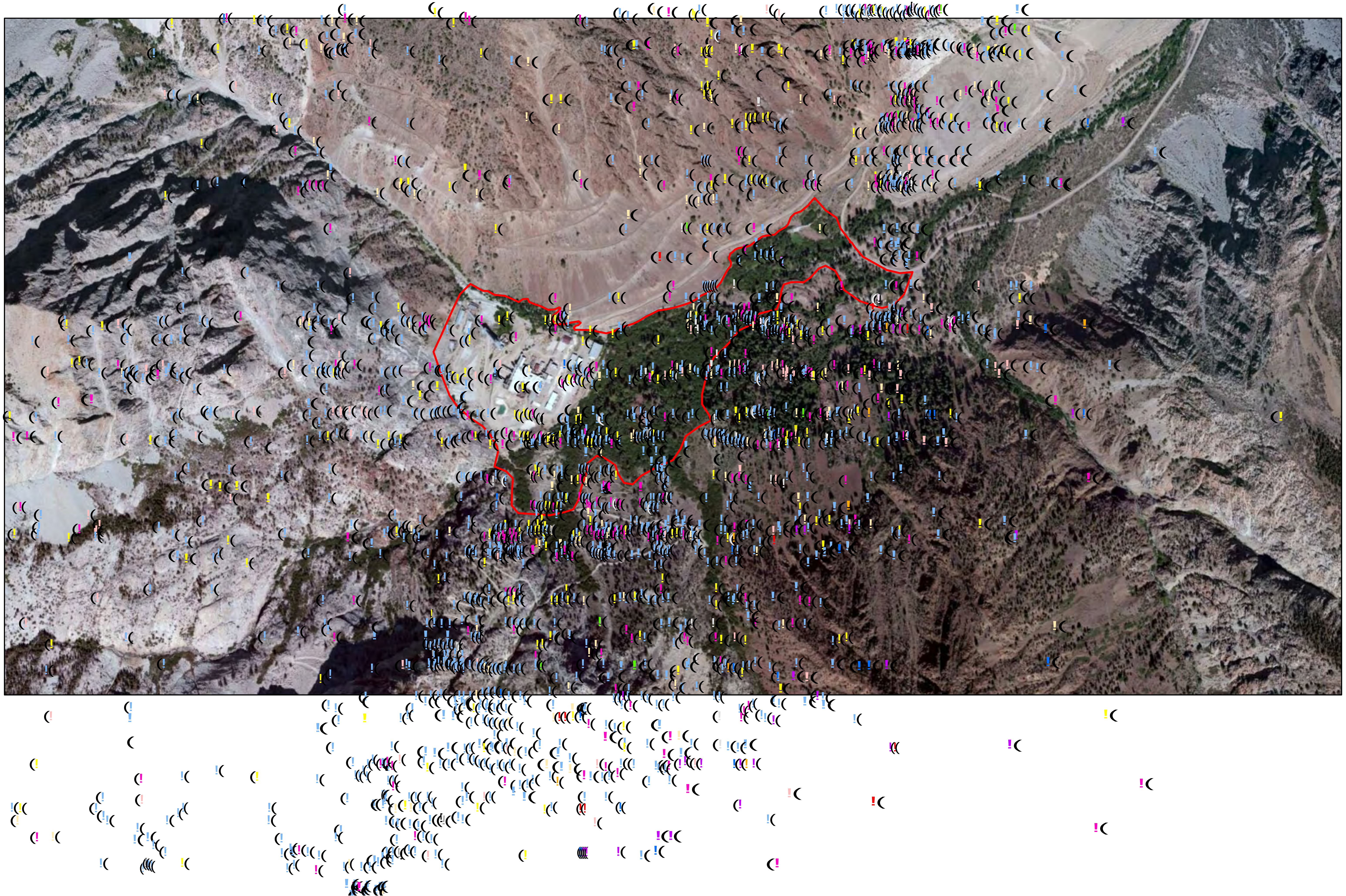
Photograph 28. View looking at SNBS herd. Note female with black GPS collar and yellow ear tag (center) with lamb. Photograph taken September 24, 2012.

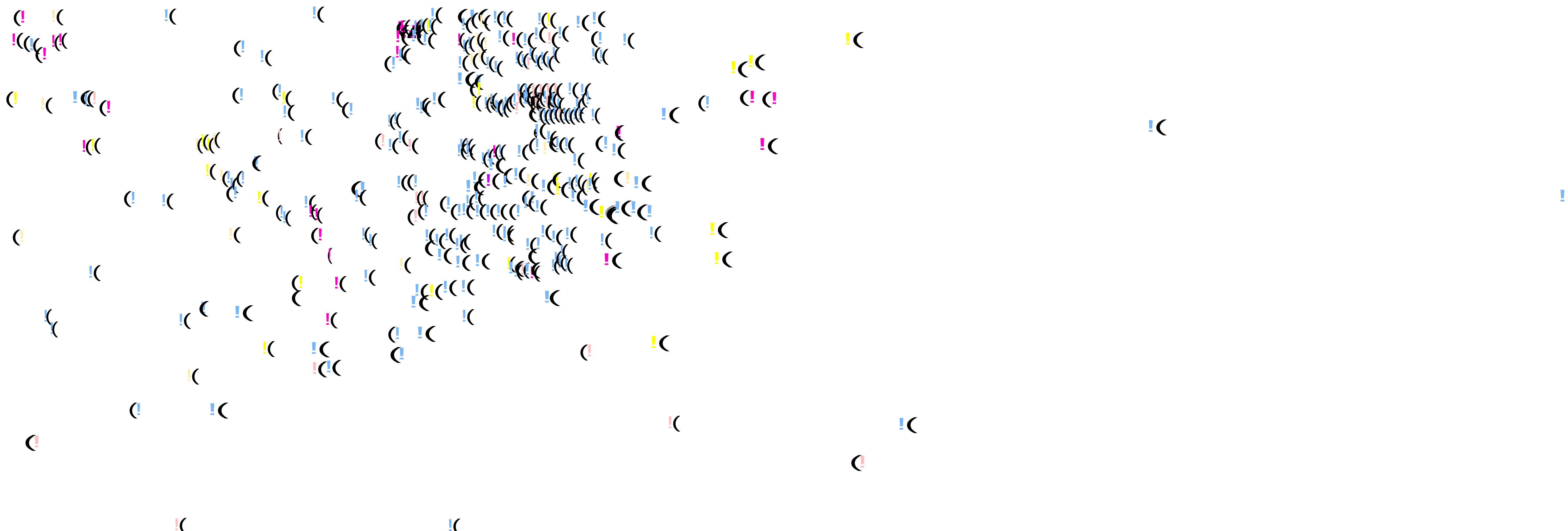
GLENN LUKOS ASSOCIATES

Exhibit 8

PINE CREEK MINE

Site Photographs





Legend

Pine Creek Mine Survey Area

Annual Detections of Wheeler Ridge Unit*

2001	2002	2005	2008	2011
	2003	2006	2009	2012
	2004	2007	2010	2012

*Each point represents detection of a collared SNBS, which may occur individually, or with a group, and can represent the same animal detected up to three times per day.

0 350 700 1,400
Feet

Soure: CDFW, 2012

PINE CREEK MINE

SNBS Detections Within Vicinity of Study Area

GLENN LUKOS ASSOCIATES

Exhibit 9

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November 14, 2012

APPENDIX A:

FLORAL COMPENDIUM

FLORAL COMPENDIUM

The floral compendium lists all species identified during botanical surveys conducted for the Project site. Taxonomy typically follows The Jepson Manual, 2nd Edition (Baldwin et al, 2012). Common plant names are taken from Baldwin (2012) and Munz (1974). Non-native species are denoted with an *.

SCIENTIFIC NAME	COMMON NAME

FERNS AND FERN ALLIES

EQUISETOPHYTA	**HORSETAILS**
EQUISETACEAE	**Horsetail Family**
Equisetum arvense	common horsetail
Equisetum hyemale	scouring rush
POLYPODIOPHYTA	**FERNS**
DENNSTAEDTIACEAE	**Bracken Fern Family**
Pteridium aquilinum	bracken fern

GYMNOSPERMS

CONIFEROPHYTA	**CONE-BEARING PLANTS**
CUPRESSACEAE	**Cypress Family**
Juniperus occidentalis	Western juniper
PINACEAE	**Pine Family**
Abies concolor lowiana	Sierra Nevada white fir
Abies magnifica	red fir
Pinus jeffreyi	Jeffrey pine

ANGIOSPERMS

MONOCOTYLEDONS — MONOCOTS

ASPARAGACEAE — **Asparagus Family**
- *Maianthemum stellatum* — Starry false Salomon's seal

LILIACEAE — **Lily Family**
- *Calochortus leichtlinii* — Leichtlin's mariposa lily
- *Lilium parvum* — Sierra tiger lily

EUDICOTYLEDONS — EUDICOTS

ADOXACEAE — **Elderberry Family**
- *Sambucus cerulea* — Blue elderberry

APIACEAE — **Carrot Family**
- *Angelica lineariloba* — Sierra angelica

APOCYNACEAE — **Dogbane Family**
- *Apocynum androsaemifolium* — spreading dogbane

ASTERACEAE — **Sunflower Family**
- *Artemisia tridentata* — great basin sagebrush
- *Aster breweri* — Brewer's aster
- *Dietaria canescens* var. *canescens* — hoary aster
- *Wyethia mollis* — woolly mule's ear

BETULACEAE — **Birch Family**
- *Betula occidentalis* — water birch

BORAGINACEAE — **Borage Family**
- *Plagiobothrys nothofulvus* — rusty popcorn flower

CACTACEAE — **Cactus Family**
- *Opuntia basilaris* var. *basilaris* — common beavertail cactus

CAPRIFOLIACEAE — **Honeysuckle Family**
- *Symphoricarpos mollis* — creeping snowberry

CORNACEAE — **Dogwood Family**
- *Cornus sericea* — Western dogwood

ERICACEAE — **Heath family**
- *Arctostaphylos nevadensis* — pinemat manzanita

FAGACEAE	**Beech Family**
Chrysolepsis sempervirens	bush chinquapin
GROSSULARIACEAE	**Gooseberry Family**
Ribes cereum	wax currant
LOASACEAE	**Stick-Leaf Family**
Mentzelia laevicaulis	giant blazing star
OROBANCHACEAE	**Broom-Rape Family**
Castilleja applegatei	Applegate's paintbrush
Castilleja exserta	purple owl's clover
Castilleja lemmonii	subalpine paintbrush
Castilleja linarifolia	Wyoming paintbrush
PAPAVERACEAE	**Poppy Family**
Argemone munita subsp. *munita*	prickly poppy
PHRYMACEAE	**Monkeyflower Family**
Mimulus tilingii	larger mountain monkey flower
PLANTAGINACEAE	**Plantain Family**
Penstemon eatonii	Eaton's firecracker
Penstemon rostriflorus	Bridge's penstemon
POLEMONIACEAE	**Phlox Family**
Ipomopsis aggregata	scarlet gilia
Leptosiphon nutallii	Nutall's linanthus
POLYGONACEAE	**Buckwheat Family**
Eriogonum kennedyi var. *purpusii*	Purpus' buckwheat
RANUNCULACEAE	**Buttercup Family**
Aconitum columbianum	Western monk's hood
Aquilegia Formosa	crimson columbine
Delphinium barbeyi	subalpine larkspur
ROSACEAE	**Rose Family**
Cercocarpus ledifolius	curl-leaf mountain mahogany
Chamaebatia foliolosa	mountain misery
Rosa woodsii ultramontana	interior rose
Rubus parviflorus	thimbleberry
SALICACEAE	**Willow Family**
Populus fremontii	Fremont cottonwood
Populus tremuloides	quaking aspen

Salix lasiolepsis	arroyo willow
SCROPHULARIACEAE	**Figwort Family**
* *Verbascum thapsus*	woolly mullein
URTICACEAE	**Nettle Family**
Urtica dioica subsp. *holosericea*	hoary nettle

APPENDIX B:

FAUNAL COMPENDIUM

FAUNAL COMPENDIUM

The faunal compendium lists species that were either detected within or adjacent to the Project Site, either by direct observation or the presence of sign. Taxonomy and nomenclature are based on the following:

- Butterflies: Taxonomy and phylogeny is based on Jonathan Pelham. 2008. Catalogue of the Butterflies of the United States and Canada. Journal of Research on the Lepidoptera 40: xiv + 658 pp. North American Butterfly Association (2001. NABA checklist & English names of North American butterflies, second edition. North American Butterfly Association, Morristown, New Jersey.).
- Fishes: Moyle, P.B. (2002. Inland Fishes of California, second edition. University of California Press, Berkeley.).
- Amphibians and reptiles: Crother, B.I. et al.(2000. Scientific and standard English names of amphibians and reptiles of North America north of Mexico, with comments regarding confidence in our understanding. *Herpetological Circular* 29; and 2003 update.) for species taxonomy and nomenclature; Stebbins, R.C. (2003. A Field Guide to Western Reptiles and Amphibians, third edition, Houghton Mifflin, Boston.) for sequence and higher order taxonomy. Center for North American Herpetology (2013).
- Birds: American Ornithologists' Union (1998. The A.O.U. Checklist of North American Birds, seventh edition. American Ornithologists' Union, Washington D.C.; and 2000, 2002, 2003, and 2004 supplements.).
- Mammals: Grenfell, W.E., Parisi, M.D. and McGriff, D. (2003. Complete list of amphibians, reptiles, birds and mammals in California. California Department of Fish and Wildlife. http://www.dfg.ca.gov/whdab/pdfs/species_list.pdf).

LEPIDOPTERA	BUTTERFLIES
PAPILIONIDAE	**Swallowtails**
Papilio zelicaon	anise swallowtail
NYMPHALIDAE	**Brush-Footed Butterflies**
Phyciodes mylitta	Mylitta crescent
Nymphalis antiopa	mourning cloak
Liminitis lorquini	Lorquin's admiral
Adelpha bredowii californica	California sister
ARCTIIDAE	**Tiger moths and lichen moths**
Lophocarma maculata	Spotted tussock moth

OSTEICHTHEYS	**BONY FISHES**
SALMONIDAE	**Salmon And Trout**
Oncorhynchus mykiss	rainbow trout
Oncorhynchus mykiss irideus	coastal rainbow trout
Oncorhynchus mykiss aguabonita	California golden/rainbow trout hybrid
Salmo trutta	brown trout
Salvelinus fontinalis	brook trout
REPTILIA	**REPTILES**
PHRYNOSOMATIDAE	**Phrynosomatid Lizards**
Uta stansburiana	common side-blotched lizard
Sceloporus occidentalis	western fence lizard
BOIDAE	**Boas**
Charina bottae	rubber boa
AVES	**BIRDS**
ODONTOPHORIDAE	**New World Quail**
Callipepla californica	California quail
GALLIFORMES	**Wildfowl**
Dendragapus fuliginosus	Sooty grouse
COLUMBIDAE	**Pigeons And doves**
Zenaida macroura	mourning dove
TROCHILIDAE	**Hummingbirds**
Selasphorus platycercus	broad-tailed hummingbird
PICIDAE	**Woodpeckers And Allies**
Melanerpes formicivorus	acorn woodpecker
Sphyrapicus ruber	red-breasted sapsucker
TYRANNIDAE	**Tyrant Flycatchers**
Contopus cooperi	olive-sided flycatcher
CORVIDAE	**Crows And Jays**
Cyanocitta stelleri	Steller's jay
Nucifraga columbiana	Clark's nutcracker

HIRUNDINIDAE	**Swallows**
Tachycineta thalassina	violet-green swallow
PARIDAE	**Chickadees And Titmice**
Poecile gambeli	mountain chickadee
TROGLODYTIDAE	**Wrens**
Catherpes mexicanus	canyon wren
Salpinctes obsoletus	rock wren
Troglodytes aedon	house wren
CINCLIDAE	**Dippers**
Cinclus mexicanus	American dipper
TURDIDAE	**Thrushes**
Sialia currucoides	mountain bluebird
Myadestes townsendi	Townsend's solitaire
Turdus migratorius	American robin
MOTACILLIDAE	**Wagtails And Pipits**
Anthus rubescens	American pipit
PARULIDAE	**Wood Warblers And Relatives**
Dendroica petechia	yellow warbler
Oreothlypis luciae	Lucy's warbler
EMBERIZIDAE	**Emberizids**
Pipilo maculatus	spotted towhee
Melospiza melodia	song sparrow
Zonotrichia leucophrys	white-crowned sparrow
Junco hyemalis	dark-eyed junco
CARDINALIDAE	**Cardinals, Grosbeaks And Allies**
Piranga ludoviciana	western tanager
Pheucticus melanocephalus	black-headed grosbeak
ICTERIDAE	**Blackbirds**
Molothrus ater	brown-headed cowbird
Icterus bullockii	Bullock's oriole
FRINGILLIDAE	**Fringilline And Cardueline Finches and Allies**
Haemorhus mexicanus	house finch

MAMMALIA	MAMMALS
VERSPERTILIONIDAE	**Evening Bats**
Euderma maculatum	spotted bat
Myotis lucifugus	little brown myotis
Myotis yumanensis	Yuma myotis
Myotis volans	long-legged myotis
Eptesicus fuscus	big brown bat
Lasiurus cinereus	hoary bat
LEPORIDAE	**Rabbits And Hares**
Sylvilagus audubonii	desert (Audubon's) cottontail
Lepus californicus	black-tailed jackrabbit
MURIDAE	**Mice, Rats And Voles**
Phenacomys intermedius	heather vole
SCIURIDAE	**Squirrels, Chipmunks, And Marmots**
Marmota flaviventris	yellow-bellied marmot
CANIDAE	**Foxes, Wolves And Allies**
Vulpes vulpes	red fox
CERVIDAE	**Deer, Elk And Allies**
Odocoileus hemionus	mule deer
BOVIDAE	**Sheep, Goats And Allies**
Ovis canadensis	bighorn sheep
Ovis canadensis sierra	Sierra Nevada bighorn sheep

APPENDIX C:

RESULTS OF BAT SURVEYS (2011-2012)

September 15, 2012

To: Lynne Goodfellow, Pine Creek Development

679 Marina, Boulder City, NV 89005

Regarding: Bat Spring Survey of Pine Creek Mine

On the evening of June 1, 2012, I conducted a bat survey of the lowest level of the Pine Creek Mine (NAD 83, 11S 0349083 x 4136223, elevation 8095 feet). Three other observers (Jeff Ahrens and Jason Fitzgibbon of Glen Lukos Associates and Tom Haney of Pine Creek Mine) using night vision equipment augmented by auxiliary infrared lights and finger tallies assisted me in counting bats as they entered and exited from the portals for 60 minutes after dusk. The Easy Go adit on the right is covered with a chain link gate and is not easily accessible to bats. The locked gate across the left portal with the rails has gaps across the top and allows for bat access. Anabat II acoustic ultrasound detectors were placed outside both portals to record bat echolocation signals. The night was clear and calm, except for a sporadic breeze.

Results: No bats exited or entered the main adit in the hour after dark, while one bat was observed in the Easy Go, and occasionally circled outside the mine. The resident bat probably roosted in one of the warmer side drifts in the mine. Bat sounds were recorded outside of the Easy Go, most likely attributable to Yuma or California myotis (*Myotis yumanensis or californicus*) and little brown or long-legged myotis (*Myotis lucifugus* or *volans*).

Species identification is made from Anabat recordings by comparison with "voucher" calls from known hand-released bats. The most definitive calls for a species are the "search phase" calls emitted while bats are foraging, and these might be different from the hand-released bat voucher calls. When bats are flying within a confined space, such as a mine portal, the signals can vary from search phase calls. Usually the ending frequency in a FM (frequency modulated) signal is the most diagnostic, since atmospheric attenuation of the higher frequencies in the call is more severe than the lower frequencies. Different bat species can at times use similar signals, and the same species can employ a variety of sounds based on the perceptual task and the surrounding habitat. A knowledge of which bats are common to the area as well as bats that may be present but uncommon is essential to the acoustic identification process. Several points need to be considered when interpreting the acoustic data: some calls will be misidentified; the louder bats will be over-represented; "whispering" bats such as Townsend's big-eared bats may not be recorded; and the number of calls recorded is an index of bat activity and does not equate to the number of bats.

Discussion: There does not appear to be a maternity colony of bats inhabiting the lower workings. Although no bats have been captured, the Myotis sp observed are probably males. The winter inspections of the lower level of the Pine Creek Mine in January and February 2012 did not reveal any hibernating bats and the temperatures were not cool enough for hibernation, at least during the very warm winter. According to Tom Haney, there are other open mines in the vicinity that could possibly provide bat roosting habitat. The proposed hydroelectric project should not impact bats or potential roosting habitat.

Brown-Berry Biological Consulting

Patricia Brown, Ph.D.

Robert Berry, Ph.D.

February 18, 2012

To: Lynne Goodfellow, Pine Creek Development

679 Marina, Boulder City, NV 89005

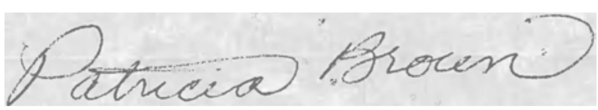
Regarding: Winter Bat Survey of Pine Creek Mine

During the day on January 2 and February 16, 2012, I conducted an underground survey for hibernating bats of the lowest level of the Pine Creek Mine (NAD 83, 1150349083 x 4136223, elevation 8095 feet). Three other observers assisted me in searching the adit for bats using bright lights en route to the pipe opening in the bulkhead, 2700 feet inside the portal. The main side drift was also visited as well as the passage leading to the Easy Go. The floor was too wet to detect guano.

Results: Two winter surveys were done since January 2 was unusually warm with temperatures in the mid 50° F inside the portal. February 16 was cooler outside and 41° F inside the portal. Temperatures deeper in the mine during both survey periods ranged from 50-55° F. The side drift without airflow was 60 °F. No bats were found on either visit.

Conclusion: The lower level of the Pine Creek Mine did not have cool enough temperatures for hibernating bats, at least during this very warm winter.

Future Recommended Surveys: One more outflight survey should be conducted in June or July to determine if a maternity rnlony of bats uses the mine. The August 21, 2011 survey found a few bats exiting from the mine, but an earlier survey should be done to determine maternity use. The temperatures in the side drift could be warm enough for this use.



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134 Wilices Crest, Bishop, CA 93514 • Phone (760) 387-2005, FAX (619) 7 2815 • PatBobBat@aol.com

Brown-Berry Biological Consulting

Patricia Brown, Ph.D.
Robert Berry, Ph.D.

September 14, 2011

To: Lynne Goodfellow, Pine Creek Development

679 Marina, Boulder City, NV 89005

Regarding: Bat Survey of Pine Creek Mine

On the evening of August 21, 2011, I conducted a bat survey of the lowest level of the Pine Creek Mine (NAD 83, 11S 0349083 x 4136223, elevation 8095 feet). The mine was entered before dark via the mine "train" driven by Tom Haney. Three other observers assisted me in searching the adit for bats using bright lights en route to the pipe opening in the bulkhead, 2700 feet inside the portal. The floor was too wet to detect guano. Cold air (40 F) flowed strongly from the pipe. Back on the surface, Anabat II acoustic ultrasound detectors were placed at the portal we had entered, the Easy Go adit to which it connects and the open area in front of the mine buildings. The Easy Go is covered with a chain link gate and is not readily accessible to bats. The locked gate across the rail portal has gaps across the top and allows for bat access. Two observers with night vision eq1,1ipment augmented by auxiliary infrared lights watched each of the portals for 60 minutes after dusk. Bats were counted as they entered and exited from the portal using finger tallies. The night was clear and calm, except for a sporadic breeze. No moon was up.

Results: Four bats exited and two entered the main adit in the hour after dark, while no bat activity was observed at the Easy Go. The resident two bats probably roosted in one of the warmer side drifts in the mine. No bat sounds were recorded outside of the Easy Go, while echolocation signals most likely attributable to Big Brown bats *(Eptesicus fuscus),* Yuma myotis *(Myotis yumanensis)* and little brown or long-legged myotis *(Myotis lucifugus* or *vo/ans)* were recorded at the main portal. In the yard outside the mine, audible echolocation signals of spotted bats *(Euderma maculatum)* were heard and recorded.

Species identification is made from Anabat recordings by comparison with "voucher" calls from known hand-released bats. The most definitive calls for a species are the "search phase" calls emitted while bats are foraging, and these might be different from the hand-released bat voucher calls. When bats are flying within a confined space, such as a mine portal, the signals can vary from search phase calls. Usually the ending frequency in a FM (frequency modulated) signal is the most diagnostic, since atmospheric attenuation of the higher frequencies in the call is more severe than the lower frequencies. Different bat species can at times use similar signals, and the same species can employ a variety of sounds based on the perceptual task and the surrounding habitat. A knowledge of which bats are common to the area as well as bats that may be present but uncommon is essential to the acoustic identification process. Several points need to be considered when interpreting the acoustic data: some calls will be misidentified; the buder bats will be over-represented; uwhispering" bats such as Townsend's big-eared bats may not be recorded; and the number of calls recorded is an index of bat activity and does not equate to the number of bats.

Future Recommended Surveys: A winter entry into the mine (December through February) would help to determine if the mine is used by hibernating bats. At this time, hip wader boots would be worn and strong lights employed to visually identify hibernating bats. The bats would not be captured.

Sincerely,
Patricia Brown

134 Wilk€s Crest, Bishop, CA 93514 • Phone ( ) 387-2005, FAX E6-19) 385'-20t5"" • PatBobBat@aol.com
Ea'tf1el4srn 760