ARIZONA HEDGEHOG CACTUS
COMPILED SURVEY REPORT

RESOLUTION
PRE-FEASIBILITY ACTIVITIES
PLAN OF OPERATIONS

Compiled for:
USDA FOREST SERVICE
TONTO NATIONAL FOREST
Globe Ranger District
Pinal and Gila Counties, Arizona

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ACRONYMS AND ABBREVIATIONS

ADEQ	Arizona Department of Environmental Quality
AGFD	Arizona Game and Fish Department
AHC	Arizona hedgehog cactus
Forest Service	USDA Forest Service
FR	Forest Road
National Forest System Lands	Public Land Administered by the Forest Service
Oak Flat Withdrawal Area	Oak Flat Picnic and Campground Withdrawal Area
PAA	Pre-feasibility Activities Area
Pre-feasibility Plan of Operations	Resolution Pre-feasibility Activities Plan of Operations
Previously Authorized Activities	Continuing pre-feasibility activities
RCM	Resolution Copper Mining
State lands	Land Owned and Administered by the Arizona State Land Department
TNF	Tonto National Forest
USFWS	U.S. Fish and Wildlife Service
WestLand	WestLand Resources, Inc.

1. INTRODUCTION AND PURPOSE

WestLand Resources, Inc. (WestLand) was chosen by the Tonto National Forest (TNF), U.S. Department of Agriculture (USDA) Forest Service (Forest Service) to act in the capacity of prime consultant providing environmental service in the analysis of the Resolution Pre-feasibility Activities Plan of Operations (Pre-feasibility Plan of Operations). WestLand was chosen by and serves under the direct supervision and control of the Forest Service. In accordance with terms and conditions of a memorandum of understanding executed between the Forest Service and Resolution Copper Mining (RCM), RCM contracted with WestLand for the completion of the analysis and is solely responsible for fees, costs and expenses relative to the scope of work.

The Pre-feasibility Plan of Operations activities include:

1) Constructing five exploration drill sites that would impact approximately 1.14 acres and directional drilling on those sites;

2) Constructing eight drill sites to accommodate a total of three deep and six shallow groundwater testing and monitoring wells that would impact approximately 1.78 acres;

3) Constructing nine drill sites that would impact approximately 1.8 acres to accommodate a total of nine geotechnical characterization boreholes;

4) Continuing exploratory and monitoring activities at previously authorized drill sites that have impacted approximately 3.02 acres;

5) Completing necessary roadway improvements on approximately 16.56 miles of existing roads that would impact approximately 29.51 acres;

6) Construction of 0.33 mile of new roads that would impact 0.59 acre; and

7) Road maintenance for access to previously authorized drill sites and the new drill sites.

The proposed, new construction activities would occur on 34.82 acres and the continuing pre-feasibility activities (Previously Authorized Activities) have impacted 3.02 acres. Total impacts would be 37.84 acres of public land administered by the Forest Service (National Forest System Lands). The proposed, new construction activities and the Previously Authorized Activities as described in the Pre-feasibility Plan of Operations are referred to in this report as the Pre-feasibility Activities.

Pre-feasibility Activities would take place in non-contiguous areas of TNF on previously authorized drill sites, proposed new drill sites, existing roads that provide access to existing or proposed drill sites, and proposed new roads (Pre-feasibility Activities Area [PAA]). Although most Pre-feasibility Activities would take place within existing drill sites and roadways, impacts to approximately 34.82 acres of previously undisturbed land within TNF are expected. The majority of the PAA lies within Pinal County, directly east of the town of Superior, with a small portion extending into adjacent Gila County (Figure 1).

The PAA is widely dispersed across the following Townships, Ranges and Sections of the Gila and Salt River Baseline and Meridian:

- Township 1 South, Range 13 East in portions of Sections 11, 13, 21 through 24, 26 through 29; and 32 through 35;
- Township 1 South, Range 14 East in portions of Sections 5, 7, and 8;
- Township 2 South, Range 12 East in portions of Sections 1, 2, 3, and 25; and
- Township 2 South, Range 13 East in portions of Sections 6, 7, 19, 20, and 30.

The purpose of this report is to 1) compile Arizona hedgehog cactus (AHC) survey data collected during RCM's preparation of the Pre-feasibility Activities Plan of Operations; and 2) compile previously completed survey data from the vicinity of the PAA that may inform the analysis of the effects of the Pre-feasibility Activities to AHC.

2. PRE-FEASIBILITY ACTIVITIES AREA DESCRIPTION

The Pre-feasibility Activities occur on federally managed lands within the TNF. The TNF, located north and east of Phoenix, is nearly 3 million acres. It extends north to the Mogollon Rim and east to the San Carlos and Fort Apache Indian reservations. Pre-feasibility Activities would occur within TNF's Globe Ranger District, which comprises approximately 450,000 acres.

As shown in Figure 1, the majority of the PAA is located east of Apache Leap, from the basin of Oak Flat to the steeper terrain between Devils and Rawhide Canyons. The northern and easternmost limit of the PAA is located near Top of the World, a high alluvial basin bisected by U.S. Highway 60 and surrounded by the rugged peaks of the Pinal Mountains. An isolated western section of the PAA abuts the town of Superior where Cross Canyon intersects S.R. 177. The southernmost portion of the PAA is also located at S.R. 177, approximately 4 miles south of Superior.

2.1. EXISTING DEVELOPMENT AND ADJACENT LAND USES

Land use within TNF in the PAA region has primarily been associated with mineral exploration and mining, low density cattle grazing, and dispersed public recreation, including rock climbing, off-road vehicle use, and recreational shooting. Mining activities have been fundamental to the economy of the area for many years, beginning with the establishment of the Silver King Mine in 1875 and the Magma Mine in the early 1900s (Buckles 2009). RCM has been conducting exploration and groundwater monitoring activities since 2001 within portions of the PAA (Forest Service Plan of Operations No. 01-02-12-002). The majority of Pre-feasibility Activities would take place along existing access roads within TNF. Access to drilling operations in the PAA would generally be gained through National Forest System Lands from either U.S. Highway 60 or State Route (S.R.) 177.

2.2. PHYSICAL RESOURCES

The PAA is within the Central Highlands Physiographic Province, a geological transitional zone between the Colorado Plateau and the Basin and Range Provinces. This zone is characterized by a series of smooth-floored basins separated by rugged mountain ranges (Chronic 1983). The PAA lies primarily within the western portion of the Pinal Mountains, an upland region known as the Globe-Superior or Pinal Highlands. The western edge of the Pinal Mountains is marked by Apache Leap, a dramatic escarpment that drops steeply to the west to the town of Superior and the lower Queen Creek Valley. The topography of the PAA vicinity ranges from sheer rock escarpments and deep canyons to gently sloping basins. Elevations within the PAA vary accordingly, ranging from approximately 2,900 feet above mean sea level (amsl) in the portions nearest to Superior to 4,800 feet amsl in sections east of Oak Flat (Figure 1).

There are a variety of geologic units underlying the PAA (Peterson 1969; Ransome 1903; Shafiqullah et. al. 1980). Although the majority of the PAA is located on Tertiary Apache Leap tuff, the northeastern portion is located primarily upon Tertiary Schultze granite, and the portions south and west of Apache Leap pass through a complex assemblage of geologic units that represent a wide span of geologic time. These units include Older Precambrian Madera diorite; Younger Precambrian Troy quartzite, Ruin granite, Pioneer shale, Dripping Spring quartzite, and Mescal limestone; Devonian Martin formation; Mississippian Escabrosa and Pennsylvanian Naco limestones; Cretaceous Willow Springs granodiorite; and Mid-Tertiary Whitetail conglomerate; and Quaternary-Tertiary basalt. Forest Road (FR) 2440, directly west of Apache Leap, lies atop relatively recent (Quaternary) unconsolidated alluvium, talus, and colluvium at the mouth of Cross Canyon. The town of Superior is located largely upon this unconsolidated deposit, and layers of varying depth are present along most drainages and flats.

Groundwater resources in the PAA vicinity include four principal aquifers 1) a deep fractured-rock aquifer occurring in mineralized rocks below approximately 2,050 feet amsl, 2) a shallower Apache Leap tuff fractured-rock aquifer which extends across the Devils Canyon and upper Queen Creek drainage basins at a level between 3,000 and 3,800 feet amsl, 3) a basin-fill-deposits aquifer lying west of Superior at a level of approximately 2,750 feet amsl, and 4) a shallow alluvial aquifer of limited extent that occurs at approximately 4,400 feet amsl near Top of the World. Multi-year groundwater monitoring has demonstrated a physical and hydraulic separation between the deep fractured-rock aquifer and the shallower aquifers above it. All surface water features in the PAA vicinity are supported by the three shallowest aquifers and are unaffected by changes in the deep aquifer's water levels (RCM 2008).

The majority of the PAA is located within the Gila River watershed. The large basin west of Apache Leap drains into Queen Creek, a tributary of the Gila River. East of Apache Leap, ephemeral channels are separated by a visually indistinct drainage divide. The channels immediately east of Apache Leap follow a relatively shallow gradient toward Queen Creek, while those farther east eventually flow into Devils and Rawhide Canyons. These large canyons drain into Mineral Creek, another tributary of the Gila River, whose confluence lies approximately 12 miles south of the PAA near the town of Kelvin. The only portions of the PAA falling within the Salt River watershed are north and east of Signal Mountain, near the Pinal-Gila County line.

Surface water flows within the PAA are restricted to a network of small to medium ephemeral drainages, most of which discharge indirectly into Queen Creek and Devils Canyon. There are no wetlands within the PAA, though wetlands likely occur along some reaches of perennial and intermittent drainages and in association with springs in the vicinity of the PAA. Both Queen Creek and Devils Canyon contain relatively small reaches of intermittent or perennial flow located downstream of most Pre-feasibility Activities. The only perennially flowing reach of Queen Creek is located west of the town of Superior and is dependent upon effluent discharge from the town's wastewater treatment plant. A naturally occurring perennial segment of Devils Canyon is located approximately 5.6 miles upstream of the confluence with Mineral Creek, and a very short intermittent section is located approximately 6.8 miles upstream of the Mineral Creek confluence.

Relatively long distances separate the Pre-feasibility Activities from perennial or intermittent drainages. The unimproved road to drill site H-E is the nearest Pre-feasibility Activity to a perennial stream segment. It is located approximately 1.3 miles from a perennial reach of Devils Canyon, beginning at the Rancho Rio confluence. Drill site OF-1 is approximately 1.4 miles from this perennial reach of Devils Canyon at the Rancho Rio confluence.

Approximately 0.4 miles separate FR 2466 and the intermittent reach of Devils Canyon. Drill site OF-1 is approximately 0.7 mile from the nearest intermittent reach of Devils Canyon near the National Forest System Lands boundary with State land.

FR 2458 follows the portions of Queen Creek identified by the Arizona Department of Environmental Quality (ADEQ) as impaired water, crossing the creek three times before arriving at drill site H-K. H-K is the closest drill site to the impaired reach of Queen Creek. It is approximately 280 feet from Queen Creek. This portion of FR 2458 is closed for public use. Omya Arizona utilizes the road for access to their limestone quarry approximately 3 miles north of U.S. Highway 60. Omya Arizona has installed cement aprons at all crossings to reduce sediment loading from FR 2458 road crossings into Queen Creek.

2.3. VEGETATION

The PAA is located within three different biotic communities according to large-scale mapping completed by Brown and Lowe (1980). WestLand has conducted extensive resource investigations throughout the PAA vicinity, and has refined Brown and Lowe's (1980) map to more accurately reflect the current vegetative composition in this region on a finer scale. The majority of the PAA lies within areas classified as interior chaparral, with a very small portion in the northeastern corner (near Top of the World) located in Madrean Evergreen Woodland. The portions of the PAA west and south of the Apache Leap escarpment are classified as the Arizona Upland subdivision of Sonoran desertscrub. Representative photographs of the three primary biotic communities within the PAA are provided in Photographs 1 through 4.

Additional biotic communities described by Brown (1994), including interior riparian deciduous forest and riparian scrublands, are also present in the PAA vicinity. While not present within the PAA itself, observations by WestLand biologists indicate that these hydroriparian communities are patchily

distributed along many of the perennial and intermittent drainages nearby (RCM 2008). Relatively isolated patches of xeroriparian and mesoriparian vegetation associated with ephemeral drainages are also located within and near the PAA.

Typical of the interior chaparral biotic community, vegetation in the central portion of the PAA is dominated by scrub live oak (*Quercus turbinella*), pointleaf manzanita (*Arctostaphylos pungens*), and catclaw mimosa (*Mimosa acerosa*). Due to high shrub cover, thin to absent soil, and low annual precipitation, this biotic community has a characteristically low density of herbaceous cover. Vegetation surrounding much of the central portion of the PAA has been impacted by recreation and cattle grazing. This is most evident along existing roadways, on the level areas adjacent to roadways, and around cattle tanks.

The far western portion of the PAA, located below the Apache Leap escarpment, is significantly lower in elevation than the rest of the PAA. This region supports vegetation consistent with the Arizona Upland subdivision of the Sonoran desertscrub biotic community. Typically wetter than other desert communities (averaging 12 to 18 inches of annual rainfall), the Arizona Upland subdivision is characterized by its appearance as a scrubland or low woodland of leguminous trees with shrubs and perennial succulents in the open areas (Brown 1994). The Jojoba-Mixed Scrub series dominates the area west of the Apache Leap. Found at the upper limits of the Arizona Upland subdivision and in transition zones between Sonoran desertscrub and interior chaparral, this series is distinguished from other desertscrub series by its characteristic chaparral-like appearance. Arizona is at the northern limit of Madrean Evergreen Woodland, and this is one of the few regions where this biotic community intergrades with the drier interior chaparral. A small section in the northeastern portions of the PAA are consistent with Brown's description of this woodland, with two oak species-Arizona white oak (*Quercus arizonica*) and Emory oak (*Quercus emoryi*)-dominating the canopy layer. Although large alligator-bark junipers (*Juniperus deppeana*) are likely to have been conspicuous here in the past as well (B. Schmalzel, WestLand, pers. comm.), a history of fire suppression and active clearing in the area has favored fire-intolerant tree species such as one-seed juniper (*Juniperus monosperma*), which are now common. Understory layers in this region generally comprise chaparral-associated species, such as pointleaf manzanita, catclaw mimosa, scrub live oak, and skunkbush (*Rhus trilobata*).

PHOTOGRAPH 1. Interior chaparral biotic community typical of much of the PAA.

[redacted]

PHOTOGRAPH 3. PAA Area along FR 320, facing east. This photograph represents the small section of Madrean Evergreen Woodland present within the PAA boundaries. The largest trees in this community consist primarily of Emory oak (*Quercus emoryi*).

PHOTOGRAPH 4. PAA near Cross Canyon, along FR 2440 facing east. The Apache Leap escarpment is visible in the background, and vegetation consistent with the Arizona Upland subdivision of Sonoran desertscrub is visible in the foreground.

3. ARIZONA HEDGEHOG CACTUS

Taxonomy of the *Triglochidiatus* section of the *Echinocereus* has been in a state of flux for the past few decades (Baker 2006; Cedar Creek Associates 1994; Matthews 1994). NatureServe and a number of scientific publications on the species refer to this variety of AHC as *Echinocereus coccineus* var. *arizonicus* (Rose ex Orcutt) Ferguson. In this document we have followed the nomenclature utilized by the USFWS.

AHC has dark green cylindroid stems that occur singly or in clusters of a few stems. Large, robust stems range from 23 to 41 centimeters (9.2 to 16.4 inches) high and 7.5 to 10.0 centimeters (3.0 to 4.0 inches) in diameter. Each stem has 7 to 12 robust tuberculate ribs. AHC has one to three gray or pinkish central spines; the largest central spine is deflexed (points down). Its 5 to 11 radial spines are slightly curved (AGFD 2003). The accompanying photograph shows the AHC's stem and spine characteristics. A unique characteristic of the *Echinocereus* genus is that the flowers burst through the sides of the stems, leaving scar tissue on the stem above the spine.

Representative photograph of Arizona hedgehog cactus (*Echinocereus triglochidiatus arizonicus*).

AHC flowers are bright red (no bluish or lavender hues), which is the distinguishing feature from other hedgehog cacti found below 1,800 meters (6,000 feet). Flowers are produced on the upper third of stem ribs and are broad, measuring about 5.0 centimeters (2.0 inches) in diameter and 7.4 centimeters (2.96 inches) long. Relative to other *Echinocereus*, AHC spines are shorter and more robust (AGFD 2003). One other *Echinocereus* species was encountered during our survey effort, *Echinocereus fasciculatus* (EF); however, the identity of the two species was not confused. In addition to the difference in spine length and width between these two *Echinocereus* species, two other considerable differences exist in the appearance of these two plants: 1) EF has a dense coverage of spines compared to that of AHC, and 2) the EF flower color is pink to magenta unlike the bright red with AHC.

This species is known to occur within TNF. Its range is restricted to the highlands of Pinal and Gila Counties. AHC are found in Pinal County in the vicinity of Dripping Springs, the Superstition and Mescal Mountains, the highlands between Globe and Superior, and in Devils Canyon and Queen Creek along the Gila/Pinal County line above 3,300 feet amsl (AGFD 2008c, TNF 1996). Known habitat requirements include open slopes and cracks and crevices between boulders in Interior Chaparral and Madrean Evergreen Woodland habitats (sensu Brown 1984). Elevation range 3,300 to 5,700 feet (TNF 1996).

The distribution of the AHC within its range appears to be closely associated with four major rock types: Tertiary Apache Leap tuff (dacite), Cretaceous or Tertiary Schultze granite, Precambrian Apache Group

Pioneer quartzites, and Precambrian Pinal schist. Cedar Creek Associates' observations of more than 1,000 specimens located during field surveys for the nearby Carlota Project indicate that the AHC prefers stable rock formations such as the Apache Leap tuff and Schultze granite (Cedar Creek Associates 1994). These rock types weather very slowly, form stable ridges and outcrops and provide opportunities for AHC to establish and grow. The remaining two rock types that are known to be associated with the AHC are either poorly distributed within the known range of the species (Pioneer quartzites) or weather more rapidly (Pinal schist). These rock types create a soil substrate that is colonized by dense stands of vegetation and do not appear to be colonized by AHC to the same extent as certain kinds of tuff or granite.

Pollination and seed dispersal for AHC appear to be accomplished by animals that are relatively mobile (TNF 1996). The principal pollinator for claret cup cacti are hummingbirds (Scobell and Scott 2002). The fruits of AHC are fleshy and red, they are low to the ground, and the seeds are relatively small. Expected dispersal agents include ground foraging birds such as quail and other species and other animals that would be attracted to the fruits and seed including lagomorphs, rodents, and ants (TNF 1996; Mark Taylor, TNF, pers. comm.). Dispersal is also likely to occur from stormwater runoff generated by summer monsoons (Mark Taylor, TNF, pers. comm.).

4. COMPILED ARIZONA HEDGEHOG CACTUS SURVEYS

The previously authorized activities were surveyed for AHC during 2001 (SWCA 2001, and WestLand 2001a). [redacted] No AHC were found during these survey efforts which were conducted on Apache Leap Tuff.

Portions of the PAA near the Oak Flat Withdrawal Area were surveyed in 2004 as part of a larger block of 3,025 acres (WestLand 2004). This survey was conducted on National Forest System Lands and the survey area corresponded with the boundaries of National Forest System Lands being considered at that time for acquisition by RCM. During the 2004 block survey nine AHC were found. While approximately 90 percent of the surveyed area is Apache Leap tuff, AHC located during survey were not uniformly distributed throughout this area and occurred at much lower density than AHC north and east of this survey area. Five of the nine plants were located in close proximity to one another [redacted].

Copies of these four previously completed survey reports are provided as Appendices A, B, C, and D.

The PAA plus a buffer area was surveyed for AHC in July and September 2007 and in January, February, March, and September 2008. [redacted] Approximately 383.25 acres of National Forest System Lands, State lands and private lands were surveyed for AHC in support of the Pre-feasibility Activities and other actions on private and State lands.

In addition to plants detected during surveys within the surveyed areas, plants observed outside of but near the survey areas were recorded and plants observed during other field work have been included in the compiled survey data. Two additional plants were detected during field work in 2009: [redacted]

Collectively, these surveys are referred to as the Compiled Surveyed Area. Table 1 summarizes these survey areas, Figure 2 depicts the survey areas.

Table 1. . Summary of the Compiled Survey Area by Land Management Type and Year. (See Figure 6-1 for location of block and drill site and road surveys.)

Land Management Status	Acres
2001 Drill Site and Road Surveys – National Forest System Lands	159.25
2004 Block Survey – National Forest System Lands	3,025
2007/2008 Drill Site and Road Surveys – National Forest System Lands	278.37
2007/2008 Drill Site and Road Surveys – State Lands	88.85
2007/2008 Drill Site and Road Surveys – Private Lands	16.03
Total Survey Area	**3,567.50**[1]

[1]Approximately 195.47 acres of the drill site and road surveys on National Forest System Lands conducted in 2001, 2007 and 2008 were also surveyed during the 2004 Block Survey.

Within the 3,567.5-acre Compiled Survey Area 140 AHC, including one dead individual, were located and mapped during AHC surveys on Forest Service and State and private lands (Figure 3). One hundred and five of these plants are located on National Forest System Lands and 35 were detected on private lands (WestLand 2009). No AHC were detected on State lands. Table 2 lists all of the plants compiled during these survey efforts. Figure 3 depicts the location of all of the AHC identified during survey and listed in Table 2. Appendix E contains the 11 aerial photographs (out of 53) of the PAA provided with the Plan of Operations submitted by RCM with AHC locations depicted on the maps.

Table 2. Observed Arizona Hedgehog Cactus Locations. Cacti No UTM NAD 27 Zone 12 Coordinates (meters) The action area is defined in the Pre-feasibility Activities Biological Assessment and Evaluation.[1]

ID	Xutm	Yutm	Side of Road	General Location	Location	Survey Date
[redacted]						

[1] The Action Area includes: 1) 243.70 acres within the Compiled Survey Area on National Forest System Lands that include the new, proposed construction activities and the action alternatives (see Figure 2); This area includes all of the proposed new Pre-feasibility Activities and the action alternatives and the survey buffer around these areas on Forest System Lands; 2) 46.87 acres within the Compiled Survey that were surveyed for the Previously Authorized Activities; 3) 5.13 miles of existing roads within National Forest System Lands (described in Table 2-7) which have been proposed for continued use but do not require any improvements; and 4) The east segment of West Access Routes 4a and 4b and adjacent surveyed buffer areas (1.69 acres) on State land (Figure 2).

ID	Xutm	Yutm	Side of Road	General Location	Location	Survey Date
[redacted]						

ID	Xutm	Yutm	Side of Road	General Location	Location	Survey Date
[redacted]						

ID	Xutm	Yutm	Side of Road	General Location	Location	Survey Date
[redacted]						

5. DISCUSSION

[redacted] Known habitat requirements include open slopes and cracks and crevices between boulders in Interior Chaparral and Madrean Evergreen Woodland habitats (sensu Brown 1984).

The distribution of the AHC within its range appears to be closely associated with four major rock types: Tertiary Apache Leap tuff (dacite), Cretaceous or Tertiary Schultze granite, Precambrian Apache Group Pioneer quartzites, and Precambrian Pinal schist. Cedar Creek Associates' observations of more than 1,000 specimens located during field surveys for the nearby Carlota Project indicate that the AHC prefers stable rock formations such as the Apache Leap tuff and Schultze granite (Cedar Creek Associates 1994). These rock types weather very slowly, form stable ridges and outcrops and provide opportunities for AHC to establish and grow. The remaining two rock types that are known to be associated with the AHC are either poorly distributed within the known range of the species (Pioneer quartzites) or weather more rapidly (Pinal schist). These rock types create a soil substrate that is colonized by dense stands of vegetation and do not appear to be colonized by AHC to the same extent as certain kinds of tuff or granite.

Based on review of habitat and range requirements stipulated by the USFWS in the General Species Information, areas identified within the PAA as habitat for AHC include those areas that 1) occur within the reported elevation range of this species; 2) occur in biotic communities similar to those known to be preferred by this species; and 3) contain bedrock geology that is known to support AHC. In accordance with the General Species Information, areas that contain all three habitat criteria are referred collectively as Potential AHC Habitat. Those areas that contain these habitat elements and have documented occurrences of AHC are referred to as AHC Habitat.

APPENDIX A

BIOLOGICAL EVALUATION OF THE OAK FLAT DRILL PADS PROJECT SITE, PINAL COUNTY, ARIZONA

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EXECUTIVE SUMMARY

SWCA, Inc. Environmental Consultants was contracted by Whitman & Company to identify and evaluate biological resources on approximately 22 acres of the Tonto National Forest east of Superior, Pinal County, Arizona. The project entails the construction of six Drill Pad sites and associated infrastructure.

The project area is in the Interior Chaparral biotic community. Portions of the area have been previously disturbed by livestock grazing and recreational use. No permanent sources of water or wetlands are depicted on USGS topographic maps, but two stock ponds, fed by an unnamed tributary to Queen Creek, are located on the project site. There are no known mine adits, mine shafts, or natural caves on the project site.

Nineteen special status species are addressed in this BE. Eight special status species listed by the USFWS as occurring in Pinal County were eliminated from further consideration in this report because their known ranges are located well outside of the project area and/or the project area does not contain habitats similar to those known to support these species. Of the eleven special status species addressed in this BE, five are listed by the U.S. Fish and Wildlife Service (USFWS) as endangered, three are listed by the Arizona Game and Fish Department (AGFD) as Wildlife of Special Concern in Arizona (WSCA), two are listed as sensitive by the U.S. Forest Service, and one is listed as Salvage Restricted under the Arizona Native Plant Law. Only those species listed by the USFWS are protected under the authority of the Endangered Species Act. Compliance with the Arizona Native Plant Law, administered by the Arizona Department of Agriculture (ADA), requires a notice of intent filed with ADA 60 days before clearing of land or destruction of native plants.

No federally endangered or threatened species are known to occur regularly or breed in the project area and the project does not occur in the vicinity of any designated or proposed Critical Habitat (AGFD# 01-09-01 [09]). Arizona hedgehog cactus is known to occur within approximately two miles of the project site but none were observed in the project area during the site visit. Lesser long-nosed bat (LLNB) is considered very unlikely to occur in the project area. The project site is outside the known range of this species and there are no known bat roost sites or *Leptonycteris* forage plants in the study area. The southwestern willow flycatcher and Mexican spotted owl are considered unlikely to occur in the project area because habitat known to support these species does not occur on the project site. Of those special status species listed by Arizona Game & Fish, only the lowland leopard frog may occur in the project area.

INTRODUCTION

PROJECT DESCRIPTION

SWCA, Inc. Environmental Consultants (SWCA) was contracted by Whitman & Company to prepare a Biological Evaluation (BE) of the Oak Flat Drill Pads Project Site in the Tonto National Forest (TNF), Pinal County, Arizona (Figure 1). [redacted]

METHODS

The objectives of the BE were to (1) classify and describe vegetation communities and geologic substrates in the project area and (2) evaluate their suitability for special status plant and animal species. A general field reconnaissance was conducted on 10 January 2001 for this purpose. Field reconnaissance included a 500-foot-diameter area around each pad location and a 50-foot-wide corridor along proposed access roads (Figure 1). A U.S. Geological Survey topographical map (Superior, AZ; 1:24,000) and conceptual drill pad locations (provided by Whitman & Company) were used to locate the boundaries of the project site and for general orientation. Vegetation was mapped and described following Brown (1994).

The special status species considered in this BE was compiled from the following sources: (1) Federally listed, proposed, and candidate species for Pinal County (USFWS AESO/SE 2-21-01-I-115, letter dated 16 January 2001); and (2) a list of species provided to SWCA by the Arizona Game and Fish Department (AGFD# 01-09-01 [09], letter dated 16 January 2001). These coordination letters are provided as Appendix A. The AGFD list included those Forest Service sensitive species and Arizona Native Plant Law (ANPL) protected species known to occur within five miles of the project site. A special status species is any species of interest to any regulatory or management agency of the federal, state or local government.

The potential for occurrence of special status species was evaluated based on 1) existing information, and 2) qualitative comparisons between known habitat requirements of each species and vegetation communities and other habitat components found on the property. We agree with Hall et al. (1997) that habitat is organism- specific and thus not synonymous with vegetation community. However, we have modified their definition of *habitat* to read as follows: an area where some members of a species regularly occur continuously or seasonally. In the field, habitat is operationally defined by the presence or absence of a

species. Areas that appear potentially suitable for a species (i.e. vegetation is similar to that in areas where the species is known to occur), but which have not been surveyed, are considered *possible habitat*.

RESULTS

AFFECTED ENVIRONMENT

Ecological Overview

The project site is located approximately three miles northeast of Superior at elevations ranging from about 4,000 to 4,200 feet. Queen Creek, which runs northwest-to-southeast, is located approximately 1.5 miles outside of the proposed project area. The northern boundary of the project area is located south of Oak Flat Campground. Rancho Rio Creek, an ephemeral drainage, is present along the most southerly end of the project area and flows north through the project area. The geologic formation of the project site is Apache Leap Tuff, in earlier reports this formation was informally termed "dacite"(Peterson 1969). Phenocrysts constitute about 40% of the rock, and consist of about three-fourths plagioclase, one-tenth each quartz and biotite, trace to one-tenth sanidine, minor hornblende, magnetite, sphene, zircon, and apatite

[redacted]

Vegetation

Vegetation communities in the project area are typical of the Interior Chaparral biotic community (Brown 1994). Dominant plant species include scrub oak (*Quercus turbinella*), pointleaf manzanita (*Arctostaphylos pungens*), catclaw acacia (*Acacia greggii*), and mountain mahogany (*Cercocarpus montanus*). Also present but less abundant, are red barberry (*Berberis haematocarpa*), Wright silk tassel (*Garrya wrightii),* broom snakeweed (*Guitierrezia sarothrae*), squawbush (*Rhus trilobata*), *Agave chrysantha,* sotol (*Dasylirion wheeleri),* and beargrass (*Nolina microcarpa*). Common cacti include prickly pear and cholla (*Opuntia spp.)*. In disturbed areas, vegetation is either nonexistent or dominated by exotic forbs and grasses. Although a substantial population of Arizona hedgehog cacti occur within about two miles of the project site (SWCA 1999a), none were observed in the project area during the 10 January field reconnaissance. The only agave species observed in the project area was *Agave chrysantha*. A list of plant species observed in the project area is provided as Appendix B. The plant list does not represent a comprehensive summary of all species that may occur.

Drill Pad Descriptions

- **Site A** - This drill site is clear of vegetation except for the upslope where there are several manzanita plants. The bermed stock pond overflows onto the road north of the berm creating a large pool, approximately 200-feet long and 75-feet wide. This is seasonal inundation based on the presence of mature oak trees in the middle of the pool. Recent livestock grazing is evident.

- **Site B** - This site is located at the confluence of an unnamed ephemeral tributary originating upstream to the west. This tributary, which contained water during the site visit due to a recent rain event, crosses the road and flows along the eastside of the road. On the east side of the tributary is a rocky upslope dominated by mountain mahogany, sotol, and yuccas.

- **Site C** - The ephemeral tributary referred to above is located approximately 5-10 feet from the road. Vegetation is dominated by manzanita, scrub oak, barberry and bunch grasses in the stream bed. Several Arizona pinons (*Pinus fallax*) are visible on both sides of the road on the rocky slopes. Livestock sign and firearm use (spent cartridges) are evident.

- **Site D** - This drill pad site is bare of vegetation except for approximately 60 tree tobacco plants (*Nicotiana* spp.) ranging in size from 6-15 feet, seep willow (*Baccharis salicifolia*), burro brush (*Hymenoclea salsola*) and young manzanita plants. The adjacent rocky hillside is dominated by mountain mahogany, and scattered agaves and sotols. Livestock sign and firearm use are evident.

- **Site F** - This drill pad is located off the main road in an open area with dominant vegetation consisting of manzanita, scrub oak, and catclaw acacia, with cholla and prickly pear occurring infrequently. There is evidence of livestock grazing, camping, firearm use, and off-road vehicles. There are many young agave plants (around 4-inches tall) near rock bases and under shrubs.

- **Site G** - The vegetative community consists of Interior Chaparral in transition with Madrean Evergreen Woodland. This drill site, the most southerly site is located in a prominent side canyon of Rancho Rio Creek. During the site visit, water was flowing at a rate of about one cubic foot/second. Filamentous algae is present along the creek bed. This area has had no previous drilling or excavation. Along the creek, vegetation is dominated by netleaf hackberry (*Celtis laevitgata*), seep willow, beargrass, ferns, lichens, mosses, and bunchgrass. The upland habitat is dominated by pointleaf manzanita, scrub oak, mountain mahogany, ferns, barberry, yucca, beargrass, prickly pear, cholla and several Arizona pinyon pines. The stream bed is 90% bedrock with small boulders.

- **Access Road** - The road adjacent to the drill pads follows the ephemeral watercourse described above. The vegetation is uniform with scrub oak, manzanita and 30-50 agave plants occurring

along the 4500 foot long proposed access road. Agaves close to the road could be impacted by widening of the road.

SPECIAL STATUS SPECIES

Nineteen special status species are addressed in this BE. The following eight special status species listed by the USFWS as occurring in Pinal County were eliminated from further consideration in this report because their known ranges are located well outside of the project area and/or the project area does not contain habitats similar to those known to support these species: Nichol's Turk's head cactus (*Echinocactus horizonthalonius* var. *nicholii*), desert pupfish (*Cyprinodon macularius*), Gila topminnow (*Poeciliopsis occidentalis occidentalis*), loach minnow (*Tiaroga cobitis*), razorback sucker (*Xyrauchen texanus*), spikedace (*Meda fulgida*), Yuma clapper rail (*Rallus longirostris yumanensis*), and cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*).

Of the 11 species addressed in detail this BE (Table 1), five are listed as threatened or endangered by the USFWS[1], and six are either of special interest to the AGFD[2] (AGFD 1996), listed as sensitive by the Forest Service[3], and/or protected under the Arizona Native Plant Law (ANPL). Only those species listed by the USFWS are protected under the authority of the Endangered Species Act (ESA). Status descriptions follow.

- **USFWS - Federal Threatened and Endangered Species.** Species listed or proposed to be listed for protection under the ESA as endangered, threatened, or candidate. The ESA specifically prohibits the "take" of a listed species. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to engage in any such conduct."[4]

- **Wildlife of Special Concern in Arizona.** The AGFD formerly lists 116 species as extinct, endangered, threatened, and candidate in Arizona (AGFD 1988). While terminology used is identical to that used by USFWS, the AGFD categories are advisory and provide no legal protection for take of designated species or modification of their habitat. To avoid confusion, AGFD is currently revising and reissuing their list as "Wildlife of Special Concern in Arizona"

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[1] USFWS protection categories are as follows: **Endangered** (any species in danger of extinction throughout all or a significant portion of its range); **Threatened** (any species likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range); **Candidate** (any species for which listing as threatened or endangered has been determined to be appropriate).

[2] AGFD protection category is as follows: **Wildlife of Special Concern in Arizona** (Taxa which are or may be in jeopardy in Arizona).

[3] Forest Service categories are as follows: **Sensitive** (species that receive special management consideration to insure population viability).

[4] Endangered Species Act, Section 3, paragraph 19. Further, 50 CFR 17.3 defines "harm" as "an act which actually kills or injures wildlife. Such acts may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering.

Table 1. Special Status Plant and Animal Species Considered in Detail in this Biological Evaluation

Species	Status			
	USFWS	USFS	AGFD	ANPL
Listed by the USFWS				
Lesser Long-nosed Bat (*Leptonycteris curasoae yerbabuena*)	E	S	WSCA	
Southwestern Willow Flycatcher (*Empidonax traillii extimus*)	E	-	WSCA	
Arizona Hedgehog Cactus (*Echinocereus triglochidiatus* var. *arizonicus*)	E	S	-	
Mexican Spotted Owl (*Strix occidentalis lucida*)	T	S	WSCA	
Bald Eagle (*Haliaeetus leucocephalus*)	T	S	WSCA	
Other				
Maricopa Leafnose Snake (*Phyllorhynchus browni lucidus*)	-	S		
Sonoran Desert Tortoise (*Gopherus agassizii*)	-	S	WSCA	
Lowland Leopard Frog (*Rana yavapaiensis*)	-	S	WSCA	
Mexican Garter Snake (*Thamnophis eques*)	-	S	WSCA	
Hohokam Agave (*Agave murpheyi*)	-	S	-	
Varied Fishhook Cactus (Mammilaria viridiflora)	-	S	-	SR

USFWS: E=Endangered, T=Threatened; Forest Service: S=Sensitive; AGFD: WSCA=Wildlife of Special Concern; ANPL: SR=Salvage Restricted

without using the terms endangered or threatened. The revised list has not yet been officially adopted, but has been published in draft form (AFGD 1996).

- **Arizona Native Plant Law Species (ADA 1997).** The Arizona Department of Agriculture administers the ANPL, and AGFD lists the plants protected under this legislation. The law categorizes protected plants as Highly Safeguarded and Salvage Restricted, among others. It is unlawful to collect, transport, or kill Highly Safeguarded or Salvage Restricted plants without a permit or without following specific regulatory procedures. Such regulation also applies to special status plants on private lands. Exceptions exist for maintenance of existing developed properties less than ten acres, maintenance of existing utilities and their associated rights-of-way, and for emergencies.

The potential for each special status species to occur in the project area was based on available literature, direct field observations, and the experience of SWCA biologists conducting this assessment. Potential for occurrence is described according to the following scale.

Extremely Unlikely to Occur. The project area is clearly outside the species currently known range or the species is extremely rare (e.g. jaguar).

Unlikely to occur. The project area is within the species currently known range and but vegetation communities do not resemble those known to be used by the species.

May Occur. The project area is within the currently known range of the species and vegetation communities resemble those to be used by the species.

Known to Occur. The species has been observed or reported in the project area.

Included for each special status species is a brief description of habitat and range, a habitat suitability evaluation, and a determination of effect (Table 2). Habitat suitability was based on a qualitative comparison between the habitat requirements of each species and vegetation communities found in the project area, and other habitat components. Language used in determination of effect was based on the U.S. Forest Service's *Documentation Desk Guide*, First Edition (U.S. Forest Service 1993).

Federally Listed Species

Lesser Long-nosed Bat (*Leptonycteris curasoae yerbabuenae*) is listed as endangered by the USFWS. In Arizona, New Mexico, and northwestern Mexico, the lesser long-nosed bat is migratory. Pregnant females arrive in late April and early May and feed on the nectar and pollen of columnar cacti, especially saguaros (Wilson 1985). Maternity roosts are generally located in natural caves or abandoned mines. In late July and early August, adult males arrive to join females and young as they disperse from maternity roosts to feed on the nectar and pollen of agave flowers. At this time, the species range expands east and north (Cockrum and Petryszyn 1991). By mid- to late September, the majority of bats have left Arizona and New Mexico and returned to Mexico. Available information suggests that the foraging radius of *Leptonycteris* bats may be up to 30 or 60 miles (USFWS 1993).

Potential for Occurrence in the Project Area: The presence of this species is extremely unlikely. No mine shafts or adits were observed in the project area nor are any depicted on the Superior, AZ topographical map as occurring within the project area. The project area is outside the known range of this species as depicted by Cockrum and Petryszyn (1991). To our knowledge, the closest known specimen record is of a single bat in the McDowell Mountains, about 50 miles northwest of the project area. The closest known roost is located in the Slate Mountains over 60 miles southwest of the project area (Hoffmeister 1986; Cockrum and Petryszyn 1991). Finally, there is no potential foraging habitat for this species in the project area. The only agave observed in the project area is *Agave chrysantha*, for which there are no documented *Leptonycteris* pollination records (Slauson 1995).

Determination of Effect: Development of the drill pads project site will not affect LLNB or its habitat.

Table 2. Summary of Potential for Occurrence of Special Status Species in the Project Area

Species	Potential For Occurrence in the Project Area
Listed by the USFWS	
Lesser Long-nosed Bat (*Leptonycteris curasoae yerbabuena*)	Extremely unlikely to occur. No roost sites, project area outside known range, and no known foraging on *A. chrysantha*.
Southwestern Willow Flycatcher (*Empidonax traillii extimus*)	Extremely unlikely to occur. No breeding habitat on the project site.
Arizona Hedgehog Cactus (*Echinocereus triglochidiatus* var. *arizonicus*)	Unlikely to occur. No plants observed on project site.
Mexican Spotted Owl (*Strix occidentalis lucida*)	Extremely unlikely to occur. No breeding habitat within project area.
Bald Eagle (*Haliaeetus leucocephalus*)	Extremely unlikely to occur. No breeding or foraging habitat within project area.
Other	
Mexican garter snake (*Thamnophis eques*)	Extremely unlikely to occur. Habitat not typical and project area above elevational range.
Sonoran Desert Tortoise (*Gopherus agassizii*)	Extremely unlikely to occur. Habitat not typical.
Lowland Leopard Frog (*Rana yavapaiensis*)	May occur occasionally in stock pond or ephemeral tributary in project area.
Maricopa Leafnose Snake (*Phyllorhynchus browni lucidus*)	Extremely unlikely to occur. Habitat not typical, project area above elevational range and none observed.
Hohokam Agave (*Agave murpheyi*)	Extremely unlikely to occur. Project area well above typical elevational range and none observed..
Varied Fishhook Cactus (*Mammilaria viridiflora*))	Extremely unlikely to occur. Project area above typical elevational range and none observed.

Southwestern Willow Flycatcher (*Empidonax traillii extimus*) is listed as endangered by the USFWS. In Arizona, willow flycatchers arrive in May and begin to nest in late May (Phillips et al. 1964) in riparian vegetation along streams, rivers, or other wetlands (Johnson et al. 1987). The following definition of potential survey habitat was provided by Arizona Partners in Flight (1996): "...suitable survey habitat for the southwestern willow flycatcher is characterized by patches of native riparian shrubs or trees including willow (*Salix* sp.), cottonwood (*Populus* sp.), box elder (*Acer negundo*), ash (*Fraxinus* sp.), or mixtures of these species; pure stands of tamarisk; or mixtures of native species and tamarisk characterized by high stem density or high foliage volume in the lowest stratum and/or mid-stratum. Tamarisk stands, particularly taller stands, may have a relatively open understory with a single stratum of foliage confined to the canopy. Patches may have either a single stratum and relatively low canopy (minimum canopy height of 12 feet) characteristic of an early- to mid-seral stage, or have several vegetation strata including

a relatively tall canopy of cottonwood or willow (e.g. 50 feet). Riparian patches may be highly irregular in shape, but should have a minimum depth of 30 feet."

The nearest critical habitat for this species is at the confluence of the San Pedro and Gila rivers (Federal Register 62:39129-39147), about 25 miles southeast of the project area.

Potential for Occurrence in the Project Area: The presence of this species is extremely unlikely. Vegetation communities in the project area do not resemble those known to support breeding southwestern willow flycatcher.

Determination of Effect: Development of the drill pads project site will not affect the willow flycatcher or its habitat.

Arizona Hedgehog Cactus (*Echinocereus triglochidiatus arizonicus*) is listed as endangered by the USFWS. The species is known to occur in central Arizona in Maricopa, Gila, and Pinal counties. Based on the map of present range provided by the USFWS (USFWS 1998), AHC occurs over an approximately 850 square-mile area. Plants are found in narrow cracks between boulders on open slopes and in the understory of shrubs in the ecotone between Madrean evergreen woodland and interior chaparral at elevations ranging from 3,300 to 5,700 feet (USFWS 1991, Cedar Creek Associates 1995). The preferred geological substrates of Arizona hedgehog cactus are dacite and granite (Cedar Creek Associates 1995, USFWS 1998).

Potential for Occurrence in the Project Area: The presence of this species is unlikely. No Arizona hedgehog cacti were observed in the project area and the nearest known location of AHC is two miles to the north (see SWCA 1999a). However, plants may occur immediately outside of the area surveyed on 10 January, 2001.

Determination of Effect: Development of the drill pads project site as currently proposed will not affect AHC or its habitat.

Mexican Spotted Owl (*Strix occidentalis lucida*) is listed as threatened by the USFWS. The spotted owl has a wide but patchy distribution throughout Arizona (except for the southwestern portion of the state) where it inhabits rocky canyonlands, coniferous forests, and oak woodlands. South of the Mogollon Rim in Arizona, spotted owls are found in montane conifer forests and in Madrean evergreen forest and woodlands (Ganey et al. 1992). Madrean evergreen habitats include the Encinal (oak) Series, Oak-Pine Series, and Cypress Series. Encinal is dominated by a variety of evergreen oaks, sometimes co-occurring with pinyon and juniper. Tree height in this habitat is usually less than 15 m, with an open canopy. According to the map of spotted owl records provided by Ganey and Balda (1989), owls have been observed within about 10 miles of the project area in the Superstition and Sierra Ancha mountains.

Potential for Occurrence in the Project Area: Visits to the project area are considered extremely unlikely. The project area does not contain the vegetative communities known to be used by this species.

Determination of Effect: Development of the drill pads project site will not affect the Mexican spotted owl or its habitat.

Bald Eagle (*Haliaeetus leucocephalus*) is listed as threatened by the USFWS. In Arizona, bald eagles nest along the Salt, Verde, Gila, Bill Williams, and Agua Fria drainages (AGFD 1988). It is estimated that between 200 and 300 eagles winter in Arizona, primarily in the White Mountains and along the Mogollon Rim (USFWS 1991). Habitat requirements include large trees, snags, or cliffs near water for nesting and near major rivers or reservoirs during winter. Bald eagles feed primarily on fish, but waterfowl, small mammals, and carrion are also eaten. The closest known nest site is near the confluence of the San Pedro and Gila rivers at Winkleman (AGFD 1997), approximately 25 miles southeast of the project area.

Potential for Occurrence in the Project Area: Visits to the project area are considered extremely unlikely. Vegetation does not resemble that known to be used by the bald eagle for breeding or foraging.

Determination of Effect: Development of the drill pads project site will not affect the bald eagle or its habitat.

Other Species

Maricopa Leafnose Snake (*Phyllorhynchus browni lucidus*) is listed as sensitive by the U.S. Forest Service. The Maricopa leafnose snake inhabits desertscrub with mesquite, saltbrush, creosote bush, palo verde, and saguaro cactus. This snake is a burrower in relatively coarse, rocky soils as well as sand at an elevation ranging from 1000 to 3000 ft (Peterson 1985).

Potential for Occurrence in the Project Area: The presence of this species is considered extremely unlikely. The project area is above the elevational range of this species and vegetation in the project area does not resemble that known to be used by this species; there is no Sonoran desertscrub vegetation.

Determination of Effect: Development of the drill pads project site will have no impact on the Maricopa leafnose snake.

Sonoran Desert Tortoise (*Gopherus agassizii*), Sonoran population, is listed as sensitive by the Forest Service and as a wildlife species of special concern by the AGFD. Sonoran desert tortoises typically occur on steep, rocky slopes in the Arizona Upland subdivision of the Sonoran Desertscrub formation at elevations ranging from 900 to 3,500 feet, though the species has been recorded at elevations above 5,000 feet. Within the Sonoran Desertscrub, specific habitat features include paloverde-cacti-mixed scrub vegetation types and extensive rock outcrops, boulder piles, and arroyos with caliche sidewalls.

Potential for Occurrence in the Project Area: The presence of this species in the project area is considered extremely unlikely. The project area is above the typical elevational range of this species and vegetation in the project area does not resemble that known to be used by this species; there is no Sonoran Desertscrub vegetation.

Determination of Effect: Development of the drill pads project site will have no impact on the Sonoran desert tortoise.

Lowland Leopard Frog (*Rana yavapaiensis*) is listed as sensitive by the Forest Service and as a wildlife species of special concern by the AGFD. This frog is commonly found in aquatic habitats at lower elevations (mostly less than 3,280 feet) in the western third and southern half of Arizona and adjacent Sonora, Mexico (Platz and Frost 1984). It is found in areas of permanent surface water, including small pools in hydroriparian areas.

Potential for Occurrence in the Project area: This species may occur in the stock pond near Drill Pad A. Also, lowland leopard frogs have been observed in Queen Creek north of project area (see SWCA 1999b).

Determination of Effect: It is unlikely that development of the drill pads project site will have an impact on the lowland leopard frog.

Mexican Garter Snake (*Thamnophis eques*) is listed as sensitive by the Forest Service and as a wildlife species of special concern by the AGFD. Mexican garter snakes typically are found in three general habitat types: 1) lowland river riparian forests and woodlands; 2) upland stream gallery forests; and 3) source-area ponds and cienegas (Rosen and Schwalbe 1988). They are most often found in well-vegetated areas where frogs, toads and prey fish are plentiful and are seldom seen more than 50 feet from permanent water.

Potential for Occurrence in the Project Area: The presence of this species in the project area is considered extremely unlikely. The stock pond in the project area does not resemble a habitat known to be used by this species; there are no riparian forests or source-area ponds or cienegas. Also, there currently are no known extant or previously existing populations of *T. eques* in the vicinity of the project area (Rosen and Schwalbe 1988); the nearest known extant population is over 50 miles away.

Determination of Effect: Development of the drill pads project site will have no impact on the Mexican garter snake.

Hohokam Agave (*Agave murpheyi*) is listed as sensitive by the Forest Service. It occurs in Sonoran Desertscrub from central Arizona south to Sonora, Mexico, at elevations ranging from 1,300 to 2,400 feet (USFWS 1992). In central Arizona, plants are often found on benches associated with prehistoric habitation and/or agricultural sites (USFWS 1992).

Potential for Occurrence in the Project Area: The presence of Hohokam agave in the project area is considered extremely unlikely. No Hohokam agaves were observed in the project area, which is well above the typical elevational range of this species. The only agave observed was *A. chrysantha*.

Determination of Effect: Development of the drill pads project site will have no impact on the Hohokam agave.

Varied Fishhook Cactus (*Mammilaria viridiflora*) is listed as Salvage Restricted (collection only with a permit) by the Arizona Native Plant Law (1993). This cactus occurs in gravelly soils of plains and hills in grassland, desert grassland, and woodland at 5,000 to 8,000 feet elevation. In Arizona it is reported to occur near Springerville, Apache County in Pinal County between Superior and Sonora, and occasional southeastward to Cochise County (Benson 1981).

Potential for Occurrence in the Project Area: The presence of the varied fishhook cactus in the project area is considered extremely unlikely. No varied fishhook cactus were observed in the project area, which is above the typical elevational range.

Determination of Effect: Development of the drill pads project site will have no impact on varied fishhook cactus.

GENERAL WILDLIFE

Game and nongame wildlife in the project area are expected to be typical of the Interior Chaparral biotic community. Large mammal species expected to occur include mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), and javelina (*Tayassu tajacu)*. The AGFD provided the following estimated densities for these species in the vicinity of the project area: white tailed deer (medium--5-7 deer/sq. mi.), mule deer (low--1-5 deer/sq. mi.), and javelina (low--0.5-1.5 javelina/sq. mi.) (SWCA 1999b). Species with large home ranges, such as black bear and mountain lion, may visit the area on occasion. The only wildlife species observed were a ladder-backed woodpecker (*Picoides scalaris*) and dark-eyed juncos (*Junco hyemalis*).

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1998 Endangered and threatened species in Arizona. Arizona Ecological Services Office, Phoenix. 115 pp.

U.S. Forest Service
1993 Documentation Desk Guide. First Edition. 45 pp.

Wilson, D.E.
1985 Status report: *Leptonycteris nivalis* (Saussure). Mexican long-nosed bat. U.S. Fish and Wildlife Service, Denver Wildlife Research Center, National Museum of Natural History, Washington, D.C. Report to U.S. Fish and Wildlife Service, Albuquerque.

APPENDIX A

AGFD and USFWS COORDINATION LETTERS

THE STATE OF ARIZONA
GAME AND FISH DEPARTMENT
2221 WEST GREENWAY ROAD, PHOENIX, AZ 85023-4399
(602) 942-3000 • WWW.AZGFD.COM

January 16, 2001

Ms. Robin Llewellyn
SWCA Inc. Environmental Consultants
343 South Scott Ave.
Tucson, AZ 85701

Re: Special Status Species Information **Township 1 South, Range 13 East, Section 32; Township 2 South, Range 12 East Section 1; Township 2 South, Range 13 East Section 6: Drill Pads in Oak Flats Area, Tonto National Forest.**

Dear Ms. Llewellyn:

The Arizona Game and Fish Department (Department) has reviewed your letter, dated January 9, 2001, regarding special status species information associated with the above-referenced project area. The Department's Heritage Data Management System (HDMS) has been accessed and current records show that the special status species listed on the attachment have been documented as occurring in the project vicinity. In addition, this project does not occur in the vicinity of any designated or proposed Critical Habitats.

The Department's HDMS data are not intended to include potential distribution of special status species. Arizona is large and diverse with plants, animals, and environmental conditions that are ever changing. Consequently, many areas may contain species that biologists do not know about or species previously noted in a particular area may no longer occur there. Not all of Arizona has been surveyed for special status species, and surveys that have been conducted have varied greatly in scope and intensity.

Making available this information does not substitute for the Department's review of project proposals, and should not decrease our opportunities to review and evaluate new project proposals and sites. The Department is also concerned about other resource values, such as other wildlife, including game species, and wildlife-related recreation. The Department would appreciate the opportunity to provide an evaluation of impacts to wildlife or wildlife habitats associated with project activities occurring in the subject area, when specific details become available.

If you have any questions regarding the attached species list, please contact me at (602) 789-3618. General status information and county distribution lists for special status species are also available on our web site at http://www.azgfd.com/frames/fishwild/hdms_site/Home.htm.

Sincerely,

Sabra S. Schwartz
Heritage Data Management System, Coordinator

SSS:ss

Attachment

cc: Bob Broscheid, Project Evaluation Program Supervisor
Russ Haughey, Habitat Program Manager, Region VI

AGFD# 01-09-01 (09)

Special Status Species within 5 miles of T1S,R13E Sec 32; T2S,R12E Sec 1; T2S,R13E Sec 6

Arizona Game and Fish Department, Heritage Data Management System

January 16, 2001

Scientific Name	Common Name	ESA	USFS	BLM	WSCA	NPL
AGAVE MURPHEYI	HOHOKAM AGAVE	SC	S	S		HS
ECHINOCEREUS TRIGLOCHIDATUS VAR ARIZONICUS	ARIZONA HEDGEHOG CACTUS	LE	S			HS
GOPHERUS AGASSIZII (SONORAN POPULATION)	SONORAN DESERT TORTOISE	SC			WC	
MAMMILLARIA VIRIDIFLORA	VARIED FISHHOOK CACTUS					SR
NYCTINOMOPS FEMOROSACCUS	POCKETED FREE-TAILED BAT			S		
PHYLLORHYNCHUS BROWNI LUCIDUS	MARICOPA LEAFNOSE SNAKE		S			
POECILIOPSIS OCCIDENTALIS OCCIDENTALIS	GILA TOPMINNOW	LE			WC	
RANA YAVAPAIENSIS	LOWLAND LEOPARD FROG	SC	S		WC	
THAMNOPHIS EQUES MEGALOPS	MEXICAN GARTER SNAKE	SC	S		WC	
THELYPTERIS PUBERULA VAR SONORENSIS	ARAVAIPA WOOD FERN			S		

No Critical Habitats in project vicinity. AGFD # 01-09-01 (09); Proposed drill pads in the Oak Flats area.

United States Department of the Interior

U.S. Fish and Wildlife Service
2321 West Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951
Telephone: (602) 640-2720 FAX: (602) 640-2730

In Reply Refer To:
AESO/SE
2-21-01-I-115

January 16, 2001

Mr. Robin Llewellyn, Biologist
SWCA Inc. Environmental Consultants
343 South Scott Avenue
Tucson, Arizona 85701

RE: Proposed Drill Pads in Oak Flats (S32, T1S, R13E; S1, T2S, R12E; and S6, T2S, R13E)

Dear Mr. Llewellyn:

This letter responds to your January 10, 2001, request for an inventory of threatened or endangered species, or those that are proposed to be listed as such under the Endangered Species Act of 1973, as amended (Act), which may potentially occur in your project area (Pinal County). The enclosed list may include candidate species as well. We hope the enclosed county list of species will be helpful. In future communications regarding this project, please refer to consultation number 2-21-01-I-115.

The enclosed list of the endangered, threatened, proposed, and candidate species includes all those potentially occurring anywhere in the county, or counties, where your project occurs. Please note that your project area may not necessarily include all or any of these species. The information provided includes general descriptions, habitat requirements, and other information for each species on the list. Also on the enclosed list is the Code of Federal Regulations (CFR) citation for each list and is available at most public libraries. This information should assist you in determining which species may or may not occur within your project area. Site-specific surveys could also be helpful and may be needed to verify the presence or absence of a species or its habitat as required for the evaluation of proposed project-related impacts.

Endangered and threatened species are protected by Federal law and must be considered prior to project development. If the action agency determines that listed species or critical habitat may be adversely affected by a federally funded, permitted, or authorized activity, the action agency must request formal consultation with the Service. If the action agency determines that the planned action may jeopardize a proposed species or destroy or adversely modify proposed critical habitat, the action agency must enter into a section 7 conference with the Service. Candidate species are those which are being considered for addition to the list of threatened or endangered species. Candidate species are those for which there is sufficient information to support a proposal for listing. Although candidate species have no legal protection under the Act, we

recommend that they be considered in the planning process in the event that they become listed or proposed for listing prior to project completion.

If any proposed action occurs in or near areas with trees and shrubs growing along watercourses, known as riparian habitat, the Service recommends the protection of these areas. Riparian areas are critical to biological community diversity and provide linear corridors important to migratory species. In addition, if the project will result in the deposition of dredged or fill materials into waterways or excavation in waterways, we recommend you contact the Army Corps of Engineers which regulates these activities under Section 404 of the Clean Water Act.

Additional information regarding critical habitat designation for the cactus ferruginous pygmy-owl is also enclosed.

The State of Arizona protects some plant and animal species not protected by Federal law. We recommend you contact the Arizona Game and Fish Department and the Arizona Department of Agriculture for State-listed or sensitive species in your project area.

The Service appreciates your efforts to identify and avoid impacts to listed and sensitive species in your project area. If we may be of further assistance, please feel free to contact Tom Gatz.

Sincerely,

Jacqueline Hanson

for David L. Harlow
Field Supervisor

Enclosures

cc: John Kennedy, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: PINAL

10/25/2000

1) LISTED

TOTAL= 13

NAME: **ARIZONA HEDGEHOG CACTUS** *ECHINOCEREUS TRIGLOCHIDIATUS ARIZONICUS*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: No CFR: 44 FR 61556,10-15-1979

DESCRIPTION: DARK GREEN CYLINDROID 2.5-12 INCHES TALL, 2-10 INCHES IN DIAMETER, SINGLE OR IN CLUSTERS. 1-3 GRAY OR PINKISH CENTRAL SPINES LARGEST DEFLEXED AND 5-11 SHORTER RADIAL SPINES. FLOWER: BRILLIANT RED, SIDE OF STEM IN APRIL- MAY

ELEVATION RANGE: 3700-5200 FT.

COUNTIES: MARICOPA, GILA, PINAL

HABITAT: ECOTONE BETWEEN INTERIOR CHAPPARAL AND MADREAN EVERGREEN WOODLAND

OPEN SLOPES, IN NARROW CRACKS BETWEEN BOULDERS, AND IN UNDERSTORY OF SHRUBS. THIS VARIETY IS BELIEVED TO INTERGRADE AT THE EDGES OF ITS DISTRIBUTION WITH VARIETIES MELANCANTHUS AND NEOMEXICANUS CAUSING SOME CONFUSION IN IDENTIFICATION.

NAME: **NICHOL'S TURK'S HEAD CACTUS** *ECHINOCACTUS HORIZONTHALONIUS VAR NICHOLII*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: No CFR: 44 FR 61927, 10-26-1979

DESCRIPTION: BLUE-GREEN TO YELLOWISH-GREEN, COLUMNAR, 18 INCHES TALL, 8 INCHES IN DIAMETER. SPINE CLUSTERS HAVE 5 RADIAL & 3 CENTRAL SPINES; ONE DOWNWARD SHORT; 2 SPINES UPWARD AND RED OR BASALLY GRAY. FLOWER:PINK FRUIT:WOOLLY WHITE

ELEVATION RANGE: 2400-4100 FT.

COUNTIES: PINAL, PIMA

HABITAT: SONORAN DESERTSCRUB

FOUND IN UNSHADED MICROSITES IN SONORAN DESERTSCRUB ON DISSECTED ALLUVIAL FANS AT THE FOOT OF LIMESTONE MOUNTAINS AND ON INCLINED TERRACES AND SADDLES ON LIMESTONE MOUNTAINSIDES.

NAME: **LESSER LONG-NOSED BAT** *LEPTONYCTERIS CURASOAE YERBABUENAE*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 53 FR 38456, 09-30-88

DESCRIPTION: ELONGATED MUZZLE, SMALL LEAF NOSE, AND LONG TONGUE. YELLOWISH BROWN OR GRAY ABOVE AND CINNAMON BROWN BELOW. TAIL MINUTE AND APPEARS TO BE LACKING. EASILY DISTURBED.

ELEVATION RANGE: <6000 FT.

COUNTIES: COCHISE, PIMA, SANTA CRUZ, GRAHAM, PINAL, MARICOPA

HABITAT: DESERT SCRUB HABITAT WITH AGAVE AND COLUNMNAR CACTI PRESENT AS FOOD PLANTS

DAY ROOSTS IN CAVES AND ABANDONED TUNNELS. FORAGES AT NIGHT ON NECTAR, POLLEN, AND FRUIT OF PANICULATE AGAVES AND COLUMNAR CACTI. THIS SPECIES IS MIGRATORY AND IS PRESENT IN ARIZONA , USUALLY FROM APRIL TO SEPTMBER AND SOUTH OF THE BORDER THE REMAINDER OF THE YEAR.

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: PINAL

10/25/2000

NAME: **DESERT PUPFISH** *CYPRINODON MACULARIUS*

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: Yes CFR: 51 FR 10842, 03-31-1986

DESCRIPTION: SMALL (2 INCHES) SMOOTHLY ROUNDED BODY SHAPE WITH NARROW VERTICAL BARS ON THE SIDES. BREEDING MALES BLUE ON HEAD AND SIDES WITH YELLOW ON TAIL. FEMALES & JUVENILES TAN TO OLIVE COLORED BACK AND SILVERY SIDES.

ELEVATION RANGE: <5000 FT.

COUNTIES: LA PAZ, PIMA, GRAHAM, MARICOPA, PINAL, YAVAPAI, SANTA CRUZ

HABITAT: SHALLOW SPRINGS, SMALL STREAMS, AND MARSHES. TOLERATES SALINE & WARM WATER

CRITICAL HABITAT INCLUDES QUITOBAQUITO SPRING, PIMA COUNTY, PORTIONS OF SAN FELIPE CREEK, CARRIZO WASH, AND FISH CREEK WASH, IMPERIAL COUNTY, CALIFORNIA. TWO SUBSPECIES ARE RECOGNIZED: DESERT PUPFISH (C. m. macularis) AND QUITOBAQUITO PUPFISH (C. m. eremus).

NAME: **GILA TOPMINNOW** *POECILIOPSIS OCCIDENTALIS OCCIDENTALIS*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 32 FR 4001, 03-11-1967

DESCRIPTION: SMALL (2 INCHES), GUPPY-LIKE, LIVE BEARING, LACKS DARK SPOTS ON ITS FINS. BREEDING MALES ARE JET BLACK WITH YELLOW FINS.

ELEVATION RANGE: <4500 FT.

COUNTIES: GILA, PINAL, GRAHAM, YAVAPAI, SANTA CRUZ, PIMA, MARICOPA, LA PAZ

HABITAT: SMALL STREAMS, SPRINGS, AND CIENEGAS VEGETATED SHALLOWS

SPECIES HISTORICALLY OCCURRED IN BACKWATERS OF LARGE RIVERS BUT IS CURRENTLY ISOLATED TO SMALL STREAMS AND SPRINGS

NAME: **LOACH MINNOW** *TIAROGA COBITIS*

STATUS: THREATENED CRITICAL HAB Yes RECOVERY PLAN: Yes CFR: 51 FR 39468, 10-28-1986; 59 FR 10898, 03-08-1994;

DESCRIPTION: SMALL (<3 INCHES LONG) SLENDER, ELONGATED FISH, OLIVE COLORED WITH DIRTY WHITE SPOTS AT THE BASE OF THE DORSAL AND CAUDAL FINS. BREEDING MALES VIVID RED ON MOUTH AND BASE OF FINS

ELEVATION RANGE: <8000 FT.

COUNTIES: PINAL, GRAHAM, GREENLEE, GILA, APACHE, NAVAJO, *YAVAPAI, *COCHISE, *PIMA

HABITAT: BENTHIC SPECIES OF SMALL TO LARGE PERENNIAL STREAMS WITH SWIFT SHALLOW WATER OVER COBBLE& GRAVEL. RECURRENT FLOODING AND NATURAL HYDROGRAPH IMPORTANT.

PRESENTLY FOUND IN ARAVAIPA CREEK, BLUE RIVER, CAMPBELL BLUE CREEK, SAN FRANCISCO RIVER, DRY BLUE CREEK, TULAROSA RIVER, EAST-WEST-AND MIDDLE FORKS OF THE GILA RIVER, EAGLE CREEK, EAST FORK, BLACK RIVER, AND THE MAINSTEM UPPER GILA RIVER. CRTITICAL HABITAT WAS REMOVED IN MARCH 1998; BUT RE-PROPOSED DEC 1999 AND FINALIZED APRIL 2000. SPECIES ALSO FOUND IN CATRON, GRANT, AND HIDALGO COUNTIES IN NEW MEXICO. *COUNTIES WITH CRITICAL HABITAT PRESENTLY CONTAIN NO KNOWN EXISTING POPULATIONS OF LOACH MINNOW.

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: PINAL

10/25/2000

NAME: **RAZORBACK SUCKER** *XYRAUCHEN TEXANUS*

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: Yes CFR: 55 FR 21154, 05-22-1990; 59 FR 13374, 03-21-1994

DESCRIPTION: LARGE (UP TO 3 FEET AND UP TO 16 POUNDS) LONG, HIGH SHARP-EDGED KEEL-LIKE HUMP BEHIND THE HEAD. HEAD FLATTENED ON TOP. OLIVE-BROWN ABOVE TO YELLOWISH BELOW.

ELEVATION RANGE: <6000 FT.

COUNTIES: GREENLEE, MOHAVE, PINAL, YAVAPAI, YUMA, LA PAZ, MARICOPA (REFUGIA), GILA, COCONINO, GRAHAM

HABITAT: RIVERINE & LACUSTRINE AREAS, GENERALLY NOT IN FAST MOVING WATER AND MAY USE BACKWATERS

SPECIES IS ALSO FOUND IN HORSESHOE RESERVOIR (MARICOPA COUNTY).CRITICAL HABITAT INCLUDES THE 100-YEAR FLOODPLAIN OF THE RIVER THROUGH GRAND CANYON FROM CONFLUENCE WITH PARIA RIVER TO HOOVER DAM; HOOVER DAM TO DAVIS DAM; PARKER DAM TO IMPERIAL DAM. ALSO GILA RIVER FROM AZ/NM BORDER TO COOLIDGE DAM; AND SALT RIVER FROM HWY 60/SR 77 BRIDGE TO ROOSEVELT DAM; VERDE RIVER FROM FS BOUNDARY TO HORSESHOE LAKE.

NAME: **SPIKEDACE** *MEDA FULGIDA*

STATUS: THREATENED CRITICAL HAB Yes RECOVERY PLAN: Yes CFR: 51 FR 23769,07-01-1986; 59 FR 10906, 03-08-1994;

DESCRIPTION: SMALL (<3 INCHES) SLIM WITH SLIVERY SIDES & 'SPINE" ON DORSAL FIN. BREDING MALES BRASSY GOLDEN COLOR

ELEVATION RANGE: <6000 FT.

COUNTIES: GRAHAM, PINAL, GREENLEE, YAVAPAI, APACHE*, COCHISE*, GILA*, NAVAJO*, PIMA*

HABITAT: MODERATE TO LARGE PERENNIAL STREAMS WITH GRAVEL COBBLE SUBSTRATES AND MODERATE TO SWIFT VELOCITIES OVER SAND AND GRAVEL SUBSTRATES. RECURRENT FLOODING AND NATURAL

PRESENTLY FOUND IN ARAVAIPA CREEK, EAGLE CREEK, VERDE RIVER, EAST-WEST- MAIN AND MIDDLE FORKS OF THE GILA RIVER IN NEW MEXICO, AND GILA RIVER FROM SAN PEDRO RIVER TO ASHURST HAYDEN DAM. CRITICAL HABITAT WAS REMOVED IN MARCH 1998, BUT RE-PROPOSED DEC 1999 AND FINALIZED IN APRIL 2000. SPECIES ALSO FOUND IN CATRON, GRANT, AND HIDALGO COUNTIES IN NEW MEXICO. *COUNTIES WITH CRITICAL HABITAT PRESENTLY CONTAIN NO KNOWN EXISTING POPULATIONS OF SPIKEDACE.

NAME: **BALD EAGLE** *HALIAEETUS LEUCOCEPHALUS*

STATUS: THREATENED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 60 FR 35999, 07-12-95

DESCRIPTION: LARGE, ADULTS HAVE WHITE HEAD AND TAIL. HEIGHT 28 - 38"; WINGSPAN 66 - 96". 1-4 YRS DARK WITH VARYING DEGREES OF MOTTLED BROWN PLUMAGE. FEET BARE OF FEATHERS.

ELEVATION RANGE: VARIES FT.

COUNTIES: YUMA, LA PAZ, MOHAVE, YAVAPAI, MARICOPA, PINAL, COCONINO, NAVAJO, APACHE, SANTA CRUZ, PIMA, GILA, GRAHAM, COCHISE

HABITAT: LARGE TREES OR CLIFFS NEAR WATER (RESERVOIRS, RIVERS AND STREAMS) WITH ABUNDANT PREY

SOME BIRDS ARE NESTING RESIDENTS WHILE A LARGER NUMBER WINTERS ALONG RIVERS AND RESERVOIRS. AN ESTIMATED 200 TO 300 BIRDS WINTER IN ARIZONA. ONCE ENDANGERED (32 FR 4001, 03-11-1967; 43 FR 6233, 02-14-78) BECAUSE OF REPRODUCTIVE FAILURES FROM PESTICIDE POISONING AND LOSS OF HABITAT, THIS SPECIES WAS DOWN LISTED TO THREATENED ON AUGUST 11, 1995. ILLEGAL SHOOTING, DISTURBANCE, LOSS OF HABITAT CONTINUES TO BE A PROBLEM. SPECIES HAS BEEN PROPOSED FOR DELISTING (64 FR 36454) BUT STILL RECEIVES FULL PROTECTION UNDER ESA.

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: PINAL

10/25/2000

NAME: **CACTUS FERRUGINOUS PYGMY-OWL** *GLAUCIDIUM BRASILIANUM CACTORUM*

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: No CFR: 62 FR 10730, 3-10-97

DESCRIPTION: SMALL (APPROX. 7"), DIURNAL OWL REDDISH BROWN OVERALL WITH CREAM-COLORED BELLY STREAKED WITH REDDISH BROWN. SOME INDIVIDUALS ARE GRAYISH BROWN

ELEVATION RANGE: <4000 FT.

COUNTIES: MARICOPA, YUMA, SANTA CRUZ, GRAHAM, GREENLEE, PIMA, PINAL, GILA, COCHISE

HABITAT: MATURE COTTONWOOD/WILLOW, MESQUITE BOSQUES, AND SONORAN DESERTSCRUB

RANGE LIMIT IN ARIZONA IS FROM NEW RIVER (NORTH) TO GILA BOX (EAST) TO CABEZA PRIETA MOUNTAINS (WEST). ONLY A FEW DOCUMENTED SITES WHERE THIS SPECIES PERSISTS ARE KNOWN, ADDITIONAL SURVEYS ARE NEEDED. CRITICAL HABITAT IN PIMA, COCHISE, PINAL, AND MARICOPA COUNTIES (64 FR 37419).

NAME: **MEXICAN SPOTTED OWL** *STRIX OCCIDENTALIS LUCIDA*

STATUS: THREATENED CRITICAL HAB Yes RECOVERY PLAN: Yes CFR: 56 FR 14678, 04-11-91

DESCRIPTION: MEDIUM SIZED WITH DARK EYES AND NO EAR TUFTS. BROWNISH AND HEAVILY SPOTTED WITH WHITE OR BEIGE.

ELEVATION RANGE: 4100-9000 FT.

COUNTIES: MOHAVE, COCONINO, NAVAJO, APACHE, YAVAPAI, GRAHAM, GREENLEE, COCHISE, SANTA CRUZ, PIMA, PINAL, GILA, MARICOPA

HABITAT: NESTS IN CANYONS AND DENSE FORESTS WITH MULTI-LAYERED FOLIAGE STRUCTURE

GENERALLY NESTS IN OLDER FORESTS OF MIXED CONIFER OR PONDERSA PINE/GAMBEL OAK TYPE, IN CANYONS, AND USE VARIETY OF HABITATS FOR FORAGING. SITES WITH COOL MICROCLIMATES APPEAR TO BE OF IMPORTANCE OR ARE PREFERED. CRITICAL HABITAT WAS REMOVED IN 1998 BUT RE-PROPOSED IN JULY2000 FOR APACHE, COCHISE, COCONINO, GILA, GRAHAM, GREENLEE, MARICOPA, MOHAVE, NAVAJO, PIMA, PINAL, SANTA CRUZ, AND YAVAPAI COUNTIES.

NAME: **SOUTHWESTERN WILLOW FLYCATCHER** *EMPIDONAX TRAILLII EXTIMUS*

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: No CFR: 60 FR 10694, 02-27-95

DESCRIPTION: SMALL PASSERINE (ABOUT 6") GRAYISH-GREEN BACK AND WINGS, WHITISH THROAT, LIGHT OLIVE-GRAY BREAST AND PALE YELLOWISH BELLY. TWO WINGBARS VISIBLE. EYE-RING FAINT OR ABSENT.

ELEVATION RANGE: <8500 FT.

COUNTIES: YAVAPAI, GILA, MARICOPA, MOHAVE, COCONINO, NAVAJO, APACHE, PINAL, LA PAZ, GREENLEE, GRAHAM, YUMA, PIMA, COCHISE, SANTA CRUZ

HABITAT: COTTONWOOD/WILLOW & TAMARISK VEGETATION COMMUNITIES ALONG RIVERS & STREAMS

MIGRATORY RIPARIAN OBLIGATE SPECIES THAT OCCUPIES BREEDING HABITAT FROM LATE APRIL TO SEPTEMBER. DISTRIBUTION WITHIN ITS RANGE IS RESTRICTED TO RIPARIAN CORRIDORS. DIFFICULT TO DISTINGUISH FROM OTHER MEMBERS OF THE EMPIDONAX COMPLEX BY SIGHT ALONE. TRAINING SEMINAR REQUIRED FOR THOSE CONDUCTING FLYCATCHER SURVEYS. CRITICAL HABITAT ON PORTIONS OF THE 100-YEAR FLOODPLAIN ON SAN PEDRO AND VERDE RIVERS; WET BEAVER AND WEST CLEAR CREEKS, INCLUDING TAVASCI MARSH AND ISTER FLAT; THE COLORADO RIVER, THE LITTLE COLORADO RIVER, AND THE WEST, EAST, AND SOUTH FORKS OF THE LITTLE COLORADO RIVER, REFERENCE 60 CFR:62 FR 39129, 7/22/97.

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: PINAL

10/25/2000

NAME: YUMA CLAPPER RAIL *RALLUS LONGIROSTRIS YUMANENSIS*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 32 FR 4001, 03-11-67; 48 FR 34182, 07-27-83

DESCRIPTION: WATER BIRD WITH LONG LEGS AND SHORT TAIL. LONG SLENDER DECURVED BILL. MOTTLED BROWN ON GRAY ON ITS RUMP. FLANKS AND UNDERSIDES ARE DARK GRAY WITH NARROW VERTICAL STRIPES PRODUCING A BARRING EFFECT.

ELEVATION RANGE: <4500 FT.

COUNTIES: YUMA, LA PAZ, MARICOPA, PINAL, MOHAVE

HABITAT: FRESH WATER AND BRACKISH MARSHES

SPECIES IS ASSOCIATED WITH DENSE EMERGENT RIPARIAN VEGETATION. REQUIRES WET SUBSTRATE (MUDFLAT, SANDBAR) WITH DENSE HERBACEOUS OR WOODY VEGETATION FOR NESTING AND FORAGING. CHANNELIZATION AND MARSH DEVELOPMENT ARE PRIMARY SOURCES OF HABITAT LOSS.

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: PINAL

10/25/2000

2) PROPOSED TOTAL= 1

NAME: **MOUNTAIN PLOVER** *CHARADRIUS MONTANUS*

STATUS: PROPOSED THREATENED CRITICAL HAB No RECOVERY PLAN: No CFR: 64 FR 7587; 02-16-1999

DESCRIPTION: IN BREEDING SEASON WITH WHITE FOREHEAD AND LINE OVER THE EYE; CONTRASTING WITH DARK CROWN; NONDESCRIPT IN WINTER. VOICE IS LOW, VARIABLE WHISTLE.

ELEVATION RANGE: VARIABLE FT.

COUNTIES: YUMA, PIMA, COCHISE, PINAL, APACHE

HABITAT: OPEN ARID PLAINS, SHORT-GRASS PRAIRIES, AND CULTIVATED FORMS.

SPECIES PRIMARILY FOUND IN ROCKY MOUNTAIN STATES FROM CANADA TO MEXICO. AZ PRIMARILY PROVIDES WITNERING HABITAT. BREEDING HAS BEEN DOCUMENTED, BUT IS RARE, AND IS LIKELY RESTRICTED TO TRIBAL AND STATE LANDS IN APACHE COUNTY.

APPENDIX B

PLANT SPECIES OBSERVED IN THE PROJECT AREA

This list includes common plant species observed during site visits. It does not represent a comprehensive summary of all species that may occur in the project area.

Scientific Name	**Common Name**
Acacia greggii	Catclaw acacia
Agave chrysantha	Agave
Arctostaphylos pungens	Pointleaf manzanita
Baccharis salicifolia	Seep willow
Berberis haematocarpa	Barberry
Celtis laevigata	Netleaf hackberry
Cercocarpus montanus	Alderleaf mountain-mahogany
Dalea formosa	Feather plume
Dasylirion wheeleri	Sotol
Eriogonum sp.	Buckwheat
Erodium spp.	Filaree
Euphorbia sp.	Spurge
Gutierrezia sarothrae	Broom snakeweed
Hymenoclea salsola	Burrobush
Lupinus sp.	Lupine
Mimosa aculeaticarpa	Wait-a-minute bush
Nolina microcarpa	Beargrass
Opuntia sp.	Prickly pear
Opuntia sp.	cholla
Pinus fallax	Arizona Pinyon Pine
Quercus turbinella	Scrub oak
Ribes sp.	Gooseberry
Rhus trilobata	Lemonade berry
Tribulus terrestris	Puncture vine
Vitis arizonica	Arizona grape
Yucca baccata	Banana yucca

APPENDIX B

OAK FLAT DRILL PAD M

BIOLOGICAL EVALUATION

Prepared for:

KENNECOTT EXPLORATION COMPANY
47206 N Magma Shaft No. 9 Road
Superior, Arizona 85273
(520) 689-9374

Prepared by:

WESTLAND RESOURCES, INC.
2343 E. Broadway Boulevard, Suite 202
Tucson, Arizona 85719
(520) 206-9585

NOVEMBER 16, 2001
Job No. 807.01

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Appendix A. Project Vicinity Plant Species List

EXECUTIVE SUMMARY

WestLand Resources, Inc. (WestLand) was retained by Kennecott Exploration Company to provide a biological evaluation (BE) for the development of the proposed Oak Flat Drill Pad M project. The objectives of this BE are to evaluate habitat suitability for special-status (federally threatened, endangered, proposed, and candidate) species and determine if the project has the potential to adversely impact these species or their critical habitat.

The project site is located within Tonto National Forest approximately three miles east of Superior, Pinal County, Arizona. As proposed, the project entails construction of one approximately 11,000 ft^2 drill pad and minor improvements to approximately 3,300 feet of existing road and 450 feet of new road. Total surface impacts of the project are not expected exceed approximately one acre.

The project occurs near the published boundary between the Arizona upland subdivision of the Sonoran Desertscrub biotic community and the interior chaparral biotic community (Brown and Lowe, 1980). Vegetation identified at the site is ecotonal between the two types, but is more closely associated with interior chaparral. The project area itself occurs in areas that appear undisturbed, except for proposed impact areas adjacent to existing roads. There is also evidence of cattle and recreational use present in the vicinity. There were no perennial water sources noted within the project area. The terrain at the site is rugged with considerable vertical relief, composed largely of boulders with little soil development. No natural caves or mine shafts or adits were found within the project area.

The U.S. Fish & Wildlife Service (USFWS) lists 17 federal special-status species (ten endangered, four threatened, one proposed, and two candidate; Table 1) as potentially occurring within Pinal County, Arizona. A screening process was used to determine which of these species required more detailed analysis in this BE. Species with ranges known not to include the project area and/or species that utilize habitats not found within or adjacent to the project area were eliminated from further evaluation.

From the results of the initial screening process we concluded that the project area does not occur within designated critical habitat for any of the special-status species, and that only the federally endangered Arizona hedgehog cactus (*Echinocereus trigłochidiatus* var. *arizonicus*) and lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*) required detailed analysis and evaluation in this BE. A survey for the Arizona hedgehog cactus was conducted over the entire project area with negative results. No surveys were conducted for the lesser long-nosed bat. A summary of Arizona hedgehog cactus and lesser long-nosed bat habitat and range, habitat suitability evaluation, and determination of potential impacts are included in section 3.3 of this BE. Based on our evaluation, we determined that it is unlikely that either of these species occurs within the project area, and that the project is not likely to impact those two or any other of the special-status species evaluated, or their critical habitat.

1. INTRODUCTION

1.1. PROJECT PURPOSE AND NEED

WestLand Resources, Inc. was retained by Kennecott Exploration Company to complete this BE in support of permitting procedures for the proposed Oak Flat Drill Pad M project. The project includes construction of one drilling pad and associated road to connect the pad to an existing access road. The drilling operations are part of a program to explore the mineral potential of a deep copper deposit. There are mine facilities associated with an existing underground mine northwest of the proposed project.

The purpose of this BE is to determine if the proposed project would affect any special-status (federally endangered, threatened, proposed, or candidate) species or their designated critical habitat.

1.2. PROJECT SETTING

The project site is located within Tonto National Forest approximately three miles east of Superior, Pinal County, Arizona on the south side of Highway 60. The proposed activities would occur [redacted] The site is at the northern end of the Pinal Mountains within a bouldery, rugged landscape at an elevation of approximately 4,060 to 4,120 feet above sea level. The surrounding area is largely undisturbed, but there is some surface disturbance associated with previous mine-related activities, grazing, and recreational use. [redacted]

1.3. PROJECT DESCRIPTION

The proposed Oak Flat Drill Pad M project includes construction of one drill pad and construction of or modification to approximately 3,750 feet of associated roads. Actual surface impacts are not expected to exceed approximately one acre. This includes approximately 0.25 acre (11,000 ft^2) associated with Drill Pad M, and approximately 0.75 acres associated with road construction and modification. The drill pad itself will cover an approximately 40 x 100 foot area (4,000 ft^2), with associated mud pits, grading, and fill occurring within the remaining 7,000 ft^2 area. Road work includes widening of approximately 3,300 feet of existing road if needed and clearing of approximately 450 feet of new road from the drill pad to the existing road. Road widening is expected to create an average of no more than 8 feet of new disturbance along the existing road for the entire 3,300 feet (26,400 ft^2 = 0.61 acres). The new road connecting Drill Pad M to the existing access road is expected to require disturbance of an average of 15 feet in width along the 450-foot length (6,750 ft^2 = 0.15 acres).

At the conclusion of the project, the drill pad area will be restored to its natural grade, mulched, and seeded in accordance with U.S. Forest Service (USFS) guidelines. Areas where the road was widened in excess of USFS low-standard road widths may be reclaimed to their former, narrower width and seeded.

2. METHODS

An inventory of biological resources on the property was conducted and evaluated to determine the potential for occurrence of special-status (USFWS endangered, threatened, proposed, and candidate) species (Table 1) that proposed project activities could affect. To determine the potential for occurrence, we compared habitat components on the property with habitats known to support the special-status species known or suspected to occur in Pinal County. This was accomplished through review of habitat descriptions and geographic ranges of species on the Pinal County list, and site visits. The site was visited on October 17, 2001 in order to conduct a variety of tasks, including a site description, biological resources inventory, habitat evaluations, and survey for the Arizona hedgehog cactus.

An initial screening analysis was conducted to determine the potential for occurrence of the special-status species at the project location. This analysis was used to determine which of the special-status species has a reasonable potential to occur at the project site. Species for which ranges are known in detail and do not include the project area, or which require habitats that clearly are not present within the project area, were not analyzed in detail for potential to occur at the site.

For species considered in greater detail, we provide information including the species' special-status listing history, range, habitat requirements, records of occurrence in the project vicinity, potential for occurrence within the project area, and potential impacts of the project on the species and its critical habitat, if any exists. This information was compiled using the methods described above, and from a survey conducted for the Arizona hedgehog cactus.

The cactus survey included a 100 percent pedestrian coverage of the project area by WestLand personnel familiar with this species and survey technique. The Drill Pad M survey included an area 500 feet in radius from the flagged tentative drill hole location. This survey area provided leeway for adjustment of the drill hole location, if necessary. The survey of the 450 feet of new road included 75 to 100 feet centered on the flagged proposed road centerline. A minimum of 10 feet was surveyed on both sides of the 3,300 feet of existing road that are proposed for widening. Attention was directed toward areas where this species typically occurs, especially in cracks between boulders and under vegetation. Surveyors were also alert for presence of desert tortoise sign.

3. RESULTS

3.1. TOPOGRAPHY AND GEOLOGY

Elevations within the project area range from approximately 4,060 to 4,120 feet above sea level. Terrain at the site is rugged with considerable vertical relief, composed largely of boulders. Numerous steep arroyos originate among peaks in the project vicinity. The soil association in the area is within the transition zone between the lithic torriorthents-lithic haplustolls-rock outcrop association (a thermic semiarid soil) and the lithic haplustolls-lithic agiustolls-rock outcrop association (a mesic semihumid soil) (Hendricks 1985). The former are shallow, cobbly and gravelly, strongly sloping to very steep soils and rock outcrop on hills and mountains, and the latter are shallow, gravelly and cobbly, moderately coarse to moderately fine-textured, gently sloping to very steep soils and rock outcrop on hills and mountains (Hendricks 1985). SWCA (2001) reported that the project site is located within the Apache Leap Tuff geologic formation, which has also been referred to as dacite. The project area itself is largely undisturbed, although mine facilities associated with an underground mine exist to the north and there is evidence of cattle and recreational use present. There were no perennial water sources noted within the project area and no natural caves or mine shafts or adits were found.

3.2. VEGETATION

The project occurs near the published boundary between the Arizona upland subdivision of the Sonoran desertscrub biotic community and the interior chaparral biotic community (Brown and Lowe, 1980). Vegetation identified at the site is ecotonal between the two types, but is more closely associated with interior chaparral.

In general, it appears that dominant vegetation in the project vicinity includes scrub oak (*Quercus turbinella*), pointleaf manzanita (*Arctostaphylos pungens*), and red barberry (*Berberis haematocarpa*). A list of vegetation species identified during site visits is provided in Appendix A. This list is not considered to be a comprehensive compilation of all vegetation species found in the area. A few of the other common or conspicuous plant species of note include emory oak (*Quercus emoryi*), birchleaf mountain mahogany (*Cercocarpus betuloides*), skunkbush (*Rhus trilobata*), hollyleaf buckthorn (*Rhamnus crocea*), mimosa (*Mimosa* spp.), yucca (*Yucca* spp.), beargrass (*Nolina microcarpa*), sotol (*Dasylirion wheeleri*), and several species of grasses.

The project area and much of the surrounding lands are largely undisturbed, although grazing has certainly affected vegetation in areas, and other human-related disturbances have resulted in establishment of non-native forbs and grasses in some areas.

3.3. SPECIAL-STATUS SPECIES EVALUATIONS

3.3.1. Screening Analysis

An initial screening analysis was conducted to determine the potential for occurrence of special-status (federally endangered, threatened, proposed, and candidate) species at the project location. There are 17 plant and animal species on the USFWS list special-status species for Pinal County (ten endangered, four threatened, one proposed, and two candidate; Table 1). This list includes three plant, one mammal, eight bird, and five fish species.

It was determined that there is extremely low to no potential at the project site for occurrence of 15 of the 17 special-status species. Those 15 species are not considered in detail in this BE. The determinations were based upon field habitat analysis, review of the best information available regarding these species, comparisons of this information with habitats available at the project site, and the known ranges of the species. Most of these 15 species have ranges that are known to not include the project area and/or are found in habitat requirements not found within the proposed project area. Table 1 lists the basis for the determination for each species.

The Arizona hedgehog cactus (*Echinocereus triglochidiatus* var. *arizonicus*) and lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*) are the only two special-status species on the list for Pinal County that have reasonable potential to utilize the habitats found within or adjacent to the project area and are discussed in more detail in the following sections. Habitat within the project area is considered to be potentially suitable to support Arizona hedgehog cactus, and for lesser long-nosed bat foraging. No other special-status species listed for Pinal County are discussed within the text of this document.

3.3.2. Species-specific Evaluations

3.3.2.1. Arizona Hedgehog Cactus Biology and Status

Listing: The Arizona hedgehog cactus is the *arizonicus* variety of *Echinocereus triglochidiatus*. This variety is listed as Endangered by the USFWS without critical habitat (44 Federal Register [FR] 61556) and as a Highly Safeguarded Protected Native Plant under the Arizona Native Plant Law (Arizona Department of Agriculture 1997).

Range of the Species: Exact locations for Arizona hedgehog cacti are not publicized due to illegal collecting, but they may be found anywhere within Maricopa, Gila, and Pinal counties where the habitat description is met. The USFWS (1998) provides a map for the variety depicting it as occurring over a large portion of southwestern Gila County, and very small portions of extreme eastern Maricopa County and north central Pinal County. More recent information indicates that this variety has a much larger range than originally thought, extending east at least as far as Greenlee County. We are aware of one location of this variety within approximately two miles of the project site.

Table 1. U.S. Fish & Wildlife Service Threatened, Endangered, Proposed, and Candidate Species for Pinal County, Arizona; Species status; and Potential for Occurrence at the Project Site and Basis for this Determination

(Information from the USFWS Summary of Listed, Proposed, Candidate, and Conservation Agreement Species in Pinal County Except as Noted.)

Species	Status	Potential Occurrence at Project Site; Basis for Potential Occurrence Determination
Arizona hedgehog cactus *Echinocereus triglochidiatus arizonicus*	Endangered	Possible but unlikely; see text.
Nichol's Turk's head cactus *Echinocactus horizonthalonius nicholii*	Endangered	None; no known appropriate habitat (limestone substrates), geographic range (mountain ranges west of Tucson).
Acuña cactus *Echinomastus erectocentrus acunensis*	Candidate	None; no appropriate habitat (limestone hills and flats), elevation (less than 2,000 ft), geographic range (western Pima County)[1].
Lesser long-nosed bat *Leptonycteris curasoae yerbabuenae*	Endangered	Maternity roost - None; no appropriate caves or tunnels: Foraging – possible but unlikely; see text.
Desert pupfish *Cyprinodon macularius*	Endangered	None; no appropriate habitat (shallow springs, small streams, and marshes).
Gila topminnow *Poeciliopsis occidentalis occidentalis*	Endangered	None; no appropriate habitat (small streams, springs, and cienegas, vegetated shallows).
Loach minnow *Tiaroga cobitis*	Threatened	None; no appropriate habitat (swift, shallow water over cobble and gravel in perennial streams).
Razorback sucker *Xyrauchen texanus*	Endangered	None; no appropriate habitat (riverine and lacustrine areas).
Spikedace *Meda fulgida*	Threatened	None; no appropriate habitat (swift water over sand and gravel in perennial streams).
Bald eagle *Haliaeetus leucocephalus*	Threatened	None; no large trees or cliffs near water.
Brown pelican *Pelecanus occidentalis californicus*	Endangered	None; no appropriate habitat (open water); coastal bird, uncommon transient in Arizona.
Cactus ferruginous pygmy-owl *Glaucidium brasilianum cactorum*	Endangered	None; no appropriate habitat (mature cottonwood/willow, mesquite bosques, Sonoran desertscrub, semi-desert grassland), elevation (<4,000 feet).
Mexican spotted owl *Strix occidentalis lucida*	Threatened	None; no appropriate habitat (canyons and dense forests).
Southwestern willow flycatcher *Empidonax traillii extimus*	Endangered	None; no appropriate habitat (dense riparian vegetation).
Yuma clapper rail *Rallus longirostrus yumanensis*	Endangered	None; no appropriate habitat (freshwater and brackish marshes).
Mountain plover *Charadrius montanus*	Candidate	None; no appropriate habitat (aquatic areas or open arid plains or short-grass prairie with scattered cactus).
Yellow-billed cuckoo *Coccyzus americanus*	Candidate	None; no appropriate habitat (large blocks of riparian woodlands: cottonwood, willow, or tamarisk galleries).

U.S. Fish & Wildlife Service Categories

Endangered	Taxa in danger of extinction throughout all or a significant portion of its range.
Threatened	Taxa likely to become Endangered in the foreseeable future throughout all or a significant portion of its range.
Proposed Endangered	Taxa proposed for listing as Endangered throughout all or a significant portion of its range.
Proposed Threatened	Taxa proposed for listing as Threatened throughout all or a significant portion of its range.
Candidate	Taxa for which sufficient data exists to support proposals to list, but formal proposals to list the species as Threatened or Endangered have not been made by the USFWS because this action is precluded by other listing activity.

1 - Benson, 1982.

Habitat Requirements: These plants are found at approximately 3,200 to 5,200 feet elevation above mean sea level on open slopes in cracks between boulders composed of dacite or granite, and within the shrub understory in these areas (USFWS 1998). The typical vegetation biotic community in which the Arizona hedgehog cactus is found is the ecotone between Madrean evergreen woodland and interior chaparral (USFWS 1998).

Records of Occurrence in Project Vicinity: We are aware of no records of occurrence of the Arizona hedgehog cactus from the project area. Exact locations of Arizona hedgehog cacti are not freely available due to illegal collecting, but we are aware of their occurrence within approximately two miles of the project site.

Potential for Occurrence in the Project Area: It is unlikely that the Arizona hedgehog cactus occurs within the project area defined in this document. WestLand conducted a pedestrian survey of the entire area in October 2001, and no individuals of this variety or species were found. During the same visit, WestLand also surveyed additional areas within one mile west of this project site with negative results. Another survey conducted by SWCA (2001), covering areas less than a mile west of the current project area, likewise found no individuals of this variety. However, because the variety is known to occur approximately two miles from the project site, and the habitat does not change drastically between the areas, there is potential for it to occur adjacent to or very near the project area.

Possible Impacts: Based on the species-specific survey results conducted for this project, it is reasonable to conclude that the Oak Flat Drill Pad M project, as proposed, will not affect the Arizona hedgehog cactus or its habitat.

3.3.2.2. Lesser Long-nosed Bat Biology and Status

Listing: The lesser long-nosed bat (LLB; *Leptonycteris curasoae yerbabuenae*) was proposed for listing as Endangered by the USFWS in 1987 (52 FR 25171), with the final ruling coming in 1988 (53 FR 38456), both without critical habitat. It is also an Arizona Game & Fish Department (AGFD) Wildlife Species of Special Concern (AGFD, 1988; AGFD, 1996).

Range of the Species: Southern Arizona from the Picacho Mountains southwest to the Agua Dulce Mountains and southeast to the Chiricahua Mountains, far southwestern New Mexico, and south and east throughout the drier portions of Mexico as far as Guatemala (USFWS, 1997).

Habitat Requirements: In Arizona, New Mexico, and northwestern Mexico, the species is migratory. Pregnant females arrive in Arizona in late April and early May, and feed on nectar and pollen of saguaros and other columnar cacti (Wilson, 1985). Maternity roosts and day roosts are usually located in natural caves or abandoned mines, while night roosts also include rock crevices, trees, shrubs, and abandoned buildings (USFWS, 1997). In late July and early August, adult males arrive to join females and young as they disperse from maternity roosts to feed on the nectar and pollen of agave flowers. At this time, the species' range expands east and north, and into plant communities generally occurring at higher elevations

than the earlier foraging grounds (Cockrum and Petryszyn, 1991). By mid- to late-September, the majority of bats have left Arizona and New Mexico and returned to Mexico.

Records of Occurrence in Project Vicinity: There are no major roost sites known from the vicinity of the project area (USFWS, 1997), and we are aware of no records for LLB within the project area. Hoffmeister (1986) depicts the project area as occurring a short distance outside the range of the LLB, with the nearest occurrence record [redacted] to the southwest. The closest known major maternity roost site to the property is the [redacted] in the [redacted] LLB once used [redacted] at the [redacted] as a maternity roost, but they have abandoned it for this purpose (USFWS, 1997). The non-maternity roost sites at the [redacted] (USFWS, 1997).

Potential for Occurrence in the Project Area: It is unlikely that the species will occur within the project area. There is no opportunity for maternity or day roosts at the project site, although night roosts, which are typically used for digesting meals, are potentially plentiful. No natural caves or mine shafts or adits were observed in the project area. There is potential for the species to forage on agave at the site after dispersal from maternity roosts, but these occurrences are likely rare at most. However, the project area is depicted as a short distance outside the range of the LLB in Hoffmeister (1986). In addition, the USFWS (1997) does not consider the one species of agave observed at the project site, *Agave chrysantha*, to be a major food source for the LLB. Only one saguaro cactus, a food source for the bat during the early summer period of the species' stay in Arizona, was noted at the site. The published range of the LLB, the distance of the project area from the nearest records of LLB occurrence, and the lack of an important food source for the LLB at the project site make it unlikely that the LLB occurs there.

Possible Impacts: Based on our evaluation of the potential availability of roost sites and appropriate foods within the project area, and the nearest records of the LLB to the project site, it is reasonable to conclude that the current Oak Flat Drill Pad M project as proposed will not affect the lesser long-nosed bat or its habitat.

4. CONCLUSIONS

WestLand evaluated the 17 USFWS special-status species listed for Pinal County, Arizona for their potential to occur within the proposed Oak Flat Drill Pad M project area. Results indicated that only the federally endangered Arizona hedgehog cactus and lesser long-nosed bat have reasonable potential to occur within the project area. The project area does not occur within critical habitat for any of the 17 species.

The vegetative community and rock type on the property are similar to that considered potentially suitable for the Arizona hedgehog cactus. No records of their occurrence within the project area were located, although there are records of occurrence of the species within approximately two miles of the property. WestLand conducted a full pedestrian survey of the project site and other sites less than one mile to the west for the cactus in October, 2001, and no individuals of this cactus variety or species were detected. Another survey conducted by SWCA in 2001 less than one mile west of this site also had negative results.

The LLB is a potential but unlikely visitor to the property, but there is no potential for maternity or day roosts on the property. One species of agave, *Agave chrysantha*, is found within the project area, although it is believed to be an insignificant source of forage for the lesser long-nosed bat. In addition, the project area is a short distance outside the range depicted for the species in Hoffmeister (1986), and the nearest occurrence to the project site we found in a records search was approximately 50 miles away. No surveys were conducted for the LLB at the property.

Based on our evaluation, no special-status species are likely to occur within the project area, and the project is not likely to impact any special-status species or their critical habitat.

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APPENDIX A

PROJECT VICINITY PLANT SPECIES LIST

OAK FLAT DRILL PAD M PROJECT SITE VICINITY PLANT LIST

DOMINANT SPECIES

- *Quercus turbinella*-Scrub oak
- *Arcostaphylos pungens*-Poiintleaf manzanita
- *Berberis haematocarpa*-Red barberry

OTHER COMMON SPECIES

- *Quercus emoryi*-Emory oak
- *Rhamnus crocea*-Hollyleaf buckthorn
- *Rhus trilobata*-Skunk bush
- *Cercocarpus betuloides*-Birchleaf mt. mahogany
- *Dodonaea viscosa*-Hop bush Juniper
- *Mimosa biuncifera*-Wait a minute bush
- *Mimosa dysocarpa*-Velvetpod mimosa
- *Nolina microcarpa*-Beargrass
- *Dasylirion wheeleri*-Sotol
- *Garrya wrightii*-Silk tassle
- *Yucca schottii*-Schott's yucca
- *Yucca baccata*-Banana yucca
- *Agave chrysantha*-Century plant
- *Ericameria laricifolia*-Turpentine bush
- *Lycium* sp.-Wolfberry
- *Eriogonum wrightii*-Wright buckwheat
- *Opuntia imbricata*-Tree cholla
- *Brickellia* sp.-Brickelbush

COMMON GRASS SPECIES

- *Bouteloua curtipendula*-Sideoats gramma
- *Muhlenbergia emersleyi*-Bullgrass
- *Schizachyrium cirratus*-Texas bluestem
- *Poa fendleriana*-Muttongrass
- *Aristida orcuttiana*-Bentawn
- *Aristida ternipes*-Spider aristida
- *Andropogon barbinodis*-Cane beardgrass

UNCOMMON SPECIES

- *Carnegiea gigantea*-Saguaro
- *Baccharis sarothroides*-Desert broom
- *Echinocereus fasciculatus*-Hedgehog
  var.*fasciculatus*
  var.*Bonkerae*
- *Opuntia spinosior*-Cane cholla
- *Opuntia engelmannii*-Engelmann prickly pear cactus
- *Opuntia chlorotica*-Pancake pear cactus
- *Juniperus deppeana*-Alligator juniper
- *Juniperus monosperma*-One-seed juniper
- *Celtis reticulata*-Canyon hackberry
- *Salix gooddingii*-Goodding willow
- *Populus fremontii*-Cottonwood
- *Vitis arizonica*-Canyon grape

APPENDIX C

RESOLUTION PROJECT

SITEWIDE BIOLOGICAL EVALUATION

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Job No. 807.01

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EXECUTIVE SUMMARY

WestLand Resources, Inc. (WestLand) was retained by Kennecott Canada Exploration Company to provide a sitewide biological evaluation (BE) for its Resolution Project drilling program located near BHP Billiton's Superior East Plant. The objectives of this BE are to identify the biological resources in the analysis area, evaluate habitat suitability for special-status species, and determine if the drilling program has the potential to adversely impact these species or their critical habitat. Special-status species considered include federally listed threatened, endangered, proposed, and candidate species known or suspected to occur within Pinal County, and species occurring on a list provided by the Arizona Game and Fish Department (AGFD), which includes species that have U.S. Forest Service (USFS), Bureau of Land Management, AGFD, and/or Arizona Native Plant Law designations and are known to occur within 5 miles of the project site.

The project analysis area is located within Tonto National Forest approximately 3 miles east of Superior, Pinal County, Arizona. The project plan consists of six drill site locations (G through L; approximately 0.25 acre each) and their associated access roads (Figure 1).

The project analysis area occurs near the boundary between the Arizona upland subdivision of the Sonoran Desertscrub biotic community and the interior chaparral biotic community (Brown and Lowe, 1980). Vegetation identified in the analysis area is ecotonal between the two types, but is more closely associated with interior chaparral. The analysis area itself is largely undisturbed, although there is evidence of cattle and recreational use present. [redacted] The terrain in the analysis area is rugged with considerable vertical relief, composed largely of boulders with little soil development. No natural caves or mine shafts or adits were observed within the analysis area.

A total of 17 federal special-status species (ten endangered, four threatened, one proposed, and two candidate) are listed for Pinal County, Arizona by the U.S. Fish & Wildlife Service (USFWS). Eight additional species occur on the special-status species list provided by AGFD. A screening process was used to determine which of these species require more detailed analysis in this BE. Species with known ranges located outside of the analysis area and/or species that utilize habitats not found within or adjacent to the analysis area were eliminated from further evaluation.

From the results of the screening process, it was determined that the following special-status species required detailed evaluation in this BE: Arizona hedgehog cactus (ETA; *Echinocereus triglochidiatus* var. *arizonicus*), lesser long-nosed bat (LLB; *Leptonycteris curasoae yerbabuenae*), common black-hawk (*Buteogallus anthracinus*), the Sonoran population of the desert tortoise (*Gopherus agassizii*), and lowland leopard frog (*Rana yavapaiensis*). The analysis area does not occur within designated critical habitat for any federal special-status species.

A survey for the Arizona hedgehog cactus was conducted over the proposed disturbance areas within the analysis area (Figure 1) with negative results. No surveys specific to the other evaluated species were conducted, although potential desert tortoise shelters were examined opportunistically during field work for the project. A summary of the habitat and range, habitat suitability evaluation, and determination of potential impacts for the evaluated species are included in section 3.3 of this BE.

Based on our evaluation, it was determined that:

- It is unlikely that the ETA or LLB occur within the analysis area, and these species will not be affected by the proposed activities.

- The desert tortoise may occur within the analysis area, but impacts to the species due to proposed project activities are unlikely. If impacts do occur, they would be limited to individual tortoises and would not lead to federal listing or loss of viability of the species; AGFD procedures for handling tortoises would be used if necessary.

- The common black-hawk and lowland leopard frog may utilize the stock ponds in the analysis area, or in the case of the frog, the ephemeral streams when wet. Impacts from the proposed project are unlikely, would be limited to individuals, and would not lead to federal listing or loss of viability of either species.

- It is extremely unlikely that the project would impact any other of the listed special-status species or any designated critical habitat.

1. INTRODUCTION

1.1. PROJECT PURPOSE AND NEED

WestLand. was retained by Kennecott Canada Exploration Company to complete this BE in support of permitting requirements for the proposed Resolution Project drilling program. The drilling operations are part of a program to explore the mineral potential of a deep copper deposit. Mine facilities associated with an existing underground mine are located north of the proposed project area.

The objectives of the BE are to identify the biological resources in the analysis area, evaluate habitat suitability for special-status species, and determine if the drilling program has the potential to adversely impact these species or their critical habitat. Special-status species considered include federally listed endangered, threatened, proposed, or candidate species, and species occurring on a list provided by AGFD (Appendix B).

1.2. PROJECT SETTING

The analysis area is located within Tonto National Forest approximately 3 miles east of Superior, Pinal County, Arizona on the south side of Highway 60 (Figure 1). Activities associated with the project will [redacted] of the Pinal Mountains, at an elevation ranging from 4,000 to 4,400 feet above mean sea level (amsl). Minor surface disturbance associated with previous mine-related activities, grazing, and recreational use is evident in the area, but the analysis area is largely undisturbed. The Oak Flat Campground is located to the north-northeast of the analysis area (Figure 1).

1.3. PROJECT DESCRIPTION

For the purposes of this BE, six drill sites (G through L; Figure 1) have been considered. The drill pads are assumed to be approximately 0.25 acre in size. Proposed access roads are estimated to be approximately 15 to 20 feet wide, depending on slope.

At the conclusion of the project, the drill pad areas will be restored to natural grade, mulched, and seeded in accordance with Forest Service guidelines. Areas where the road is in excess of USFS low-standard road widths may be reclaimed to their former, narrower width and seeded.

2. METHODS

An inventory of biological resources within the analysis area was conducted to identify the nature of the biological resources and determine the potential for occurrence of special-status species (USFWS endangered, threatened, proposed, and candidate, and species occurring on a list provided for this project by AGFD; Appendices A and B) within the analysis area. To determine the potential for occurrence, habitat components in the analysis area were compared with habitats known to support the special-status species found or suspected to occur in Pinal County or occurring on the AGFD list. This was accomplished through review of habitat descriptions and geographic ranges of species on the lists and site visits. The analysis area was visited on October 17, 18, and 31, 2001 in order to conduct a biological resources inventory, habitat evaluations, and species surveys.

An initial screening analysis was conducted to determine the potential for occurrence of the special-status species within the analysis area. Species with known ranges or distributions that are well outside the analysis area and/or with habitat requirements not supported by the analysis area were eliminated from further consideration.

For species considered in greater detail, information including the species' special-status listing history, range, habitat requirements, records of occurrence in the project vicinity, potential for occurrence within the analysis area, and potential impacts of the project on the species and its critical habitat, if any exists, has been provided. This information was based on the methods described above and on species-specific surveys conducted for the Arizona hedgehog cactus.

The cactus surveys included a pedestrian survey of the proposed disturbance areas within the analysis area, including a significant 'buffer' around the proposed disturbance areas (Figure 1). Surveys at the drill pads included a 500-foot radius from the flagged center of the proposed drill pad. Proposed new roads were surveyed 75 to 100 feet on either side of the flagged proposed road centerline. Attention was directed toward areas where this species typically occurs, especially in cracks between boulders and under vegetation. Surveyors were also alert for presence of desert tortoise sign.

3. RESULTS

3.1. TOPOGRAPHY AND GEOLOGY

Elevations within the analysis area range from approximately 4,000 to 4,400 feet amsl. Terrain in the near vicinity is rugged with considerable vertical relief, composed largely of dacite boulders. Numerous steep arroyos originate among the peaks in the analysis area and vicinity.

The soil association in the analysis area is within the transition zone between the lithic torriorthents-lithic haplustolls-rock outcrop association (a thermic semiarid soil) and the lithic haplustolls-lithic agiustolls-rock outcrop association (a mesic semihumid soil) (Hendricks 1985). The former are shallow, cobbly and gravelly, strongly sloping to very steep soils and rock outcrop on hills and mountains, and the latter are shallow, gravelly and cobbly, moderately coarse to moderately fine-textured, gently sloping to very steep soils and rock outcrop on hills and mountains (Hendricks 1985).

SWCA (2001) reported that the analysis area is located within the Apache Leap Tuff geologic formation. No natural caves, mine shafts, or adits were found within the analysis area.

3.2. VEGETATION

The project occurs near the published boundary between the Arizona upland subdivision of the Sonoran desertscrub biotic community and the interior chaparral biotic community (Brown and Lowe, 1980). Vegetation identified within the analysis area is ecotonal between the two types, but is more closely associated with interior chaparral.

In general, it appears that dominant vegetation in the analysis area includes scrub oak (*Quercus turbinella*), pointleaf manzanita (*Arctostaphylos pungens*), and red barberry (*Berberis haematocarpa*). A list of vegetation species identified during site visits is provided in Appendix A. This list is not considered to be a comprehensive compilation of all vegetation species found in the area. A few of the other common or conspicuous plant species of note include emory oak (*Quercus emoryi*), birchleaf mountain mahogany (*Cercocarpus betuloides*), skunkbush (*Rhus trilobata*), hollyleaf buckthorn (*Rhamnus crocea*), mimosa (*Mimosa* spp.), yucca (*Yucca* spp.), beargrass (*Nolina microcarpa*), sotol (*Dasylirion wheeleri*), and several species of grasses.

The analysis area and much of the surrounding lands are largely undisturbed, although grazing has affected vegetation in some areas. Other human-related disturbances have resulted in establishment of non-native forbs and grasses in some areas.

3.3 WILDLIFE

The analysis area supports a number of game species, including javelina (*Tayassu tajacu*), white tail (*Odocoileus virginianus*) and mule deer (*Odocoileus hemionus*), as well as such non-game species as Gambel's quail (*Lophortyx gambelii*), mourning (*Zenaida macroura*) and white-winged dove (*Zenaida asiatica*). Other species which may occur in the area include ringtail (*Bassariscus astutus*), mountain lion (*Felis concolor*), bobcat (*Felis rufus*), and black bear (*Ursus americanus*). Species densities within the analysis area were identified as: white tail deer (medium: 5 to 7/sq. mi.), mule deer (low: 1 to 5/sq. mi.), and javelina (low: 0.5- to .5/sq. mi.). Water in the analysis area is provided by ephemeral drainages and two stock ponds.

3.4. SPECIAL-STATUS SPECIES EVALUATIONS

Special-status species considered in this BE include federally listed threatened, endangered, proposed, and candidate species known or suspected to occur within Pinal County, and species occurring on a list provided by the AGFD that includes species that have USFS, U.S. Bureau of Land Management (BLM), AGFD, and/or Arizona Native Plant Law (ANPL) designations and are known to occur within 5 miles of the project site.

3.4.1. Screening Analysis

A total of 17 federal special-status species (ten endangered, four threatened, one proposed, and two candidate; Appendix A) are listed for Pinal County, Arizona by the USFWS. Of these 17 species, the following 12 species were eliminated from further consideration because their known ranges or distributions are well outside the analysis area and/or the analysis area does not support habitat similar to that known to support them: Nichol's Turk's head cactus (*Echinocactus horizonthalonius* var. *nicholii*), Acuña cactus (*Echinomastus erectocentrus acunensis*), desert pupfish (*Cyprinodon macularius*), Gila topminnow (*Poeciliopsis occidentalis occidentalis*), loach minnow (*Tiaroga cobitis*), razorback sucker (*Xyrauchen texanus*), spikedace (*Meda fulgida*), brown pelican (*Pelecanus occidentalis californicus*), Yuma clapper rail (*Rallus longirostris yumanenesis*), cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*), mountain plover (*Charadrius montanus*), and yellow-billed cuckoo (*Coccyzus americanus*).

Eight additional species occur on the list provided by AGFD. Three species on the AGFD list which have only BLM or ANPL designations [pocketed free-tailed bat (*Nyctinomops femorosaccus*), varied fishhook cactus (*Mammillaria viridiflora*), and Aravaipa wood fern (*Thelypteris puberula* var. *sonorensis*)] were not considered in this BE, as they are not relevant to the analysis area.

The remaining 10 special-interest species, their current listing status, and their potential for occurrence in the analysis area are summarized in Table 1.

Table 1. Special status Species; Status; and Potential for Occurrence in the Analysis Area and Basis for this Determination
(Detailed discussions are presented for species in bold)

Species	Status	Potential Occurrence at Project Site; Basis for Potential Occurrence Determination
Arizona hedgehog cactus *Echinocereus triglochidiatus arizonicus*	E, S	Unlikely; none observed in species specific surveys.
Lesser long-nosed bat *Leptonycteris curasoae yerbabuenae*	E, S, WSCA	Maternity roost - None; no appropriate caves or tunnels; Foraging – unlikely; some agave observed.
Bald eagle *Haliaeetus leucocephalus*	T, S, WSCA	Extremely unlikely; no appropriate habitat (large trees or cliffs near water)
Mexican spotted owl *Strix occidentalis lucida*	T, S, WSCA	Extremely unlikely; no appropriate habitat (canyons and dense forests)
Southwestern willow flycatcher *Empidonax traillii extimus*	E, WSCA	Extremely unlikely; no appropriate habitat (dense riparian vegetation)
Common Black-hawk *Buteogallus anthracinus*	S, WSCA	May forage in analysis area; no appropriate nesting habitat (cottonwood-willow association and mixed broadleaf forest)
Mexican garter snake *Thamnophis eques*	S, WSCA	Extremely unlikely; no appropriate habitat, analysis area outside known elevation range.
Maricopa leafnose snake *Phyllorhynchus browni lucidus*	S	Extremely unlikely; no appropriate habitat, analysis area outside known elevation range.
Sonoran desert tortoise *Gopherus agassizii*	S, WSCA	May occur; none observed.
Lowland leopard frog *Rana yavapaiensis*	S, WSCA	May occur; stock ponds or ephemeral drainages when flowing.
Hohokam agave *Agave murpheyi*	S	Extremely unlikely; analysis area well above known elevation range.

U.S. Fish & Wildlife Service Categories

E – Endangered	Taxa in danger of extinction throughout all or a significant portion of its range.
T – Threatened	Taxa likely to become Endangered in the foreseeable future throughout all or a significant portion of its range.
P – Proposed	Taxa proposed for listing as Threatened or Endangered throughout all or a significant portion of its range.
C – Candidate	Taxa for which sufficient data exists to support proposals to list, but formal proposals to list the species as Threatened or Endangered have not been made by the USFWS because this action is precluded by other listing activity.

S – Sensitive; species designated by the Forest Service which receive special management consideration to insure population viability.

WSCA - Wildlife of Special Concern in Arizona; wildlife species of concern to the Arizona Game & Fish Department because they are or may be in jeopardy in Arizona.

3.4.2. Species-specific Evaluations

Of the species considered for this report, the Arizona hedgehog cactus (*Echinocereus triglochidiatus* var. *arizonicus*), lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*), common black-hawk (*Buteogallus anthracinus*), Sonoran desert tortoise (*Gopherus agassizi*), and lowland leopard frog (*Rana yavapaiensis*) are the only special-status species that have reasonable potential to utilize the habitats found within the analysis area and are discussed in more detail in the following sections.

3.4.2.1 Arizona Hedgehog Cactus Biology and Status

Listing: The Arizona hedgehog cactus is a variety of *Echinocereus triglochidiatus* that is listed as Endangered by the USFWS (44 Federal Register [FR] 61556) and as a Highly Safeguarded Protected Native Plant under the ANPL (Arizona Department of Agriculture, 1997). There is no critical habitat designated for this variety.

Range of the Species: This species may be found anywhere within Maricopa, Gila, and Pinal counties where the habitat description is met (see below). A distribution map provided by the USFWS (1998) shows the species' distribution occurring over a large portion of southwestern Gila County, and very small portions of extreme eastern Maricopa County and north central Pinal County. More recent information indicates that this variety has a much larger range than originally thought, extending east at least as far as Greenlee County.

Habitat Requirements: These plants are found at approximately 3,200 to 5,200 feet amsl on open slopes within cracks between boulders composed of dacite or granite, and within the shrub understory in these areas (USFWS 1998). The typical vegetation biotic community in which the Arizona hedgehog cactus is found is the ecotone between Madrean evergreen woodland and interior chaparral (USFWS, 1998).

Records of Occurrence in Project Vicinity: Species specific surveys conducted within the analysis area did not locate any Arizona hedgehog cacti. Exact locations of the Arizona hedgehog cactus are not freely available due to potential for illegal collecting, but one occurrence of the variety is known to be within approximately 2 miles of the analysis area.

Potential for Occurrence in the Analysis area: It is unlikely that the Arizona hedgehog cactus occurs within the defined analysis area. Pedestrian surveys of the proposed disturbance areas were conducted, and no individuals of this variety or species were found. However, because the variety is known to occur approximately 2 miles from the analysis area, and the habitat within the analysis area is somewhat similar to that known to support this species, there is potential for individuals of this species to occur in areas adjacent to or very near the surveyed areas.

Possible Impacts: Implementation of the Resolution Project will have no impact on the Arizona hedgehog cactus or its habitat.

3.4.2.2 Lesser Long-nosed Bat Biology and Status

Listing: The lesser long-nosed bat (LLB; *Leptonycteris curasoae yerbabuenae*) was proposed for listing as Endangered by the USFWS in 1987 (52 FR 25171), with the final ruling coming in 1988 (53 FR 38456). LLB is also listed by the AGFD as a Wildlife Species of Special Concern (AGFD, 1988; AGFD, 1996). No critical habitat has been designated for this species.

Range of the Species: This species occurs in southern Arizona from the Picacho Mountains southwest to the Agua Dulce Mountains and southeast to the Chiricahua Mountains, far southwestern New Mexico, and south and east throughout the drier portions of Mexico as far as Guatemala (USFWS, 1997).

Habitat Requirements: In Arizona, New Mexico, and northwestern Mexico, the species is migratory. Pregnant females arrive in Arizona in late April and early Ma, and feed on nectar and pollen of saguaros and other columnar cacti (Wilson, 1985). Maternity roosts and day roosts are usually located in natural caves or abandoned mines, while night roosts also include rock crevices, trees, shrubs, and abandoned buildings (USFWS, 1997). In late July and early August, adult males arrive to join females and young as they disperse from maternity roosts to feed on the nectar and pollen of agave flowers. At this time, the species' range expands east and north, and into plant communities generally occurring at higher elevations than the earlier foraging grounds (Cockrum and Petryszyn, 1991). By mid- to late-September, the majority of bats have left Arizona and New Mexico and returned to Mexico.

Records of Occurrence in Project Vicinity: There are no major roost sites known from the vicinity of the analysis area (USFWS, 1997), and there are no records for LLB within the analysis area. According to Hoffmeister (1986), the analysis area occurs outside the range of the LLB, with the nearest occurrence

[redacted]

Potential for Occurrence in the Analysis Area: It is unlikely that the species occurs within the analysis area. Though potential night roosts occur in the analysis area, no potential maternity or day roosts (caves, mine shafts, adits) were observed in the project vicinity. Potential forage plants (saguaros and agave) are sparse within the analysis area, with only a single saguaro observed. The agave observed within the analysis area, *Agave chrysantha*, is not considered to be a major food source for LLB (USFWS, 1997). Given the published range of the LLB, the distance of the analysis area from the nearest recorded occurrences, and the lack of an important food source, it is unlikely that the LLB occurs within the analysis area.

Possible Impacts: Implementation of the Resolution Project will have no impact on LLB or its habitat.

3.4.2.3 Common Black-hawk Biology and Status

The common black-hawk (*Buteogallus anthracinus*) is listed as a Wildlife Species of Special Concern by the AGFD and as Sensitive by the USFS. The species has no USFWS designation. The common black-hawk is an obligate riparian nester dependent on mature, relatively undisturbed cottonwood-willow and mixed broadleaf habitat associations supported by a permanent flowing stream. They prefer groves of

trees over single trees and streams less than 12 inches deep of low to moderate gradient with many riffles, runs, pools, and boulders. Common black-hawks feed on land crabs, amphibians, and crayfish.

Potential for Occurrence in the Analysis Area: The analysis area does not contain habitat typically utilized by this species, such as mature riparian trees. If individuals of this species nest in the near vicinity, they may occasionally forage at the stock ponds.

Possible Impacts: Implementation of the Resolution Project will have no impact on the common black-hawk.

3.4.2.4 Sonoran Desert Tortoise Biology and Status

The Sonoran desert tortoise (*Gopherus agassizii*) is listed as a Wildlife Species of Special Concern by the AGFD and as Sensitive by the USFS. The species has no USFWS designation. Sonoran desert tortoises typically occur on steep, rocky slopes in the Arizona Upland subdivision of the Sonoran Desertscrub formation at elevations ranging from 900 to 3,500 feet, though the species has been recorded at elevations above 5,300 feet in the Santa Catalina Mountains. Sonoran populations principally inhabit the bajadas and rocky slopes of the Sonoran Desertscrub. Specific habitat features include palo verde-cacti-mixed scrub vegetation types and extensive rock outcrops, boulder piles, and arroyos with caliche sidewalls.

Potential for Occurrence in the Analysis Area: This species may occur in the analysis area. The analysis area is within the known elevational range and has boulder piles and rocky slopes with many crevices that appear suitable as shelters.

Possible Impacts: Implementation of the Resolution Project may impact individual Sonoran desert tortoises but is unlikely to result in federal listing or loss of viability. The AGFD has specific recommendations for handling tortoises encountered on development projects (Appendix B).

3.4.2.5 Lowland Leopard Frog Biology and Status

The lowland leopard frog (*Rana yavapaiensis*) is listed as a Wildlife Species of Special Concern by the AGFD and as Sensitive by the USFS. The species has no USFWS designation. This frog inhabits aquatic systems in desertscrub to pinyon-juniper habitats within Arizona and adjacent Sonora, Mexico (Sredl et al, 1997). It is found in areas of permanent surface water, including small pools in hydroriparian areas.

[redacted]

Possible Impacts: Implementation of the Resolution Project may impact individual lowland leopard frogs, but is unlikely to result in federal listing or loss of viability.

4. CONCLUSIONS

Based on our evaluation, it was determined that:

- It is unlikely that the ETA or LLB occur within the analysis area, and these species will not be affected by the proposed activities.

- The desert tortoise may occur within the analysis area, but impacts to the species due to proposed project activities are unlikely. If impacts do occur, they would be limited to individual tortoises and would not lead to federal listing or loss of viability of the species; AGFD procedures for handling tortoises would be used if necessary.

- [redacted]

- It is extremely unlikely that the project would impact any other of the listed special-status species or any designated critical habitat.

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SITE VICINITY PLANT LIST

DOMINANT SPECIES

- *Quercus turbinella*-Scrub oak
- *Arcostaphylos pungens*-Poiintleaf manzanita
- *Berberis haematocarpa*-Red barberry

OTHER COMMON SPECIES

- *Quercus emoryi*-Emory oak
- *Rhamnus crocea*-Hollyleaf buckthorn
- *Rhus trilobata*-Skunk bush
- *Cercocarpus betuloides*-Birchleaf mt. mahogany
- *Dodonaea viscosa*-Hop bush Juniper
- *Mimosa biuncifera*-Wait a minute bush
- *Mimosa dysocarpa*-Velvetpod mimosa
- *Nolina microcarpa*-Beargrass
- *Dasylirion wheeleri*-Sotol
- *Garrya wrightii*-Silk tassle
- *Yucca schottii*-Schott's yucca
- *Yucca baccata*-Banana yucca
- *Agave chrysantha*-Century plant
- *Ericameria laricifolia*-Turpentine bush
- *Lycium* sp.-Wolfberry
- *Eriogonum wrightii*-Wright buckwheat
- *Opuntia imbricata*-Tree cholla
- *Brickellia* sp.-Brickelbush

COMMON GRASS SPECIES

- *Bouteloua curtipendula*-Sideoats gramma
- *Muhlenbergia emersleyi*-Bullgrass
- *Schizachyrium cirratus*-Texas bluestem
- *Poa fendleriana*-Muttongrass
- *Aristida orcuttiana*-Bentawn
- *Aristida ternipes*-Spider aristida
- *Andropogon barbinodis*-Cane beardgrass

UNCOMMON SPECIES

- *Carnegiea gigantea*-Saguaro
- *Baccharis sarothroides*-Desert broom
- *Echinocereus fasciculatus*-Hedgehog
  var.*fasciculatus*
  var.*Bonkerae*
- *Opuntia spinosior*-Cane cholla
- *Opuntia engelmannii*-Engelmann prickly pear cactus
- *Opuntia chlorotica*-Pancake pear cactus
- *Juniperus deppeana*-Alligator juniper
- *Juniperus monosperma*-One-seed
- *Celtis reticulata*-Canyon hackberry
- *Salix gooddingii*-Goodding willow
- *Populus fremontii*-Cottonwood
- *Vitis arizonica*-Canyon grape

APPENDIX A

USFWS LISTED, PROPOSED, AND CANDIDATE SPECIES LIST FOR PINAL COUNTY, ARIZONA

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR PINAL COUNTY, ARIZONA

(Main Source: U.S. Fish & Wildlife Department, Listed, Proposed, and Candidate Species for Arizona, August 15, 2001)

TOTAL = 17

Name	Status	Critical Habitat	Recovery Plan	CFR	Description	Elevation Range (ft.)	Habitat
Arizona hedgehog cactus *(Echinocereus triglochidiatus arizonicus)*	Endangered	No	No	44 FR 61556, 10-15-79	Dark green cylindroid that is 2.5 to 12 inches in diameter, single or in clusters, 1 to 3 gray or pinkish central spines with the largest deflexed and 5 to 11 shorter radial spines. Flower: brilliant red, side of stem in April through May.	3,700 – 5,200	Ecotone between interior chapparal and madrean evergreen woodland.
Nichol's Turk's head cactus *(Echinocactus horizonthalonius* var. *nicholii)*	Endangered	No	No	44 FR 61927, 10-26-97	Blue-green to yellowish-green, columnar, 18 inches tall, 8 inches in diameter, spine clusters have 5 radial and 3 central spines (one downward short and 2 upward and red or basally gray). Flower: pink with woolly white fruit.	2,400 – 4,100	Sonoran desertscrub at the foot of limestone mountains and on inclined terraces and saddles on limestone mountains.
Lesser long-nosed bat *(Leptonycteris curasoae yerbabuena)*	Endangered	No	Yes	53 FR 38456, 09-30-88	Elongated muzzle with a small leaf nose and long tongue. Yellowish brown or gray above and cinnamon brown below. Tail minute and appears to be lacking. Easily disturbed.	less than 6,000	Desertscrub habitat with agave and columnar cacti present as food plants.
Desert Pupfish *(Cyprinodon macularius)*	Endangered	Yes	Yes	51 FR 10842, 03-31-86	Small (2 inches), smoothly rounded body shape with narrow vertical bars on the sides. Breeding males are blue on the head and sides with yellow on tail. Females and juveniles have a tan- to olive-colored back and silvery sides.	less than 5,000	Shallow springs, small streams, and marshes. Tolerates saline and warm water.
Gila topminnow (*Poeciliopsis occidentalis occidentalis*)	Endangered	No	Yes	32 FR 4001, 03-11-67	Small (2 inches), guppy-like, live bearing, and lacks dark spots on its fins. Breeding males are jet black with yellow fins.	less than 4,500	Small streams, springs, cienegas, and with shallows.

Name	Status	Critical Habitat	Recovery Plan	CFR	Description	Elevation Range (ft.)	Habitat
Loach minnow *(Tiaroga cobitis)*	Threatened	Yes	Yes	51 FR 39468, 10-28-86; 59 FR 10898, 03-08-94	Small (less than 3 inches), slender, elongated fish. Olive colored with dirty white spots at the base of the dorsal and caudal fins. Breeding males are vivid red on mouth and base of fins.	less than 8,000	Small to large perennial streams with swift, shallow water over cobble and gravel.
Razorback sucker *(Xyrauchen texanus)*	Endangered	Yes	Yes	56 FR 54957, 10-23-91; 59 FR 13374, 03-21-94	Large (up to 3 feet and up to 16 pounds), long with high, sharp-edged, keel-like hump behind the head. Flattened on top, olive-brown above to yellowish below.	less than 6,000	Riverine and lucustrine areas. Generally, not in fast moving water and may use backwaters.
Spikedace *(Meda fulgida)*	Threatened	Yes	Yes	51 FR 23769, 07-01-86; 65 FR 24327, 04-25-00	Small (less than 3 inches long) and slim with silvery sides and "spine" on the dorsal and pelvic fins. Breeding males are a brassy golden color.	less than 6,000	Moderate to large perennial streams in shallow riffles and moderate to swift currents or pools with a sand or gravel substrate.
Bald eagle (*Haliaeetus leucocephalus*)	Threatened	No	Yes	60 FR 35999, 07-12-95	Large. Adults have white head and tail. Height is 28 to 38 inches with a wingspan of 66 to 96 inches. Those one to four years of age are dark with varying degrees of mottled brown plumage. Feet bare of feathers.	varies	Large trees or cliffs near water (reservoirs, rivers, and streams) with abundant prey.
Brown pelican (*Pelecanus occidentalis californicus)*	Endangered	No	Yes	35 FR 16047, 10-13-70; 35 FR 18320, 12-02-70	Large, dark gray-brown, webbed-footed water bird with a pouch underneath its long bill. Adults have a white head and neck, brownish black breast, and silver-gray upper parts.	varies	Coastal land and islands. Arizona lakes and rivers. A subspecies is an uncommon transient in Arizona
Cactus ferruginous pygmy-owl *(Glaucidium brasilianum cactorum)*	Endangered	Yes	No	62 FR 10730, 03-10-97	Small (approximately 7 inches), diurnal owl. Reddish-brown overall color with cream-colored belly streaked with reddish brown. Some individuals are grayish brown.	less than 4,000	Mature cottonwood/willow, mesquite bosques, and Sonoran desertscrub.
Mexican spotted owl (*Strix occidentalis lucida*)	Threatened	Yes	Yes	56 FR 14678, 04-11-91; 66 FR 8530, 02-01-01	Medium-sized with dark eyes and no ear tufts. Brownish and heavily spotted with white or beige.	4,100 – 9,000	Nests in canyons and dense forests with multi-layered foliage structure.

Name	Status	Critical Habitat	Recovery Plan	CFR	Description	Elevation Range (ft.)	Habitat
Southwestern willow flycatcher (*Empidonax traillii extimus)*	Endangered	Yes	No	60 FR 10694, 02-27-95	Small passerine (about 6 inches) with a grayish-green back and wings, whitish throat, light olive-gray breast and pale yellowish belly. Two wingbars are visible. Eye-ring is faint or absent.	less than 8,500	Cottonwood/willow and tamarisk vegetation communities along rivers and streams.
Yuma clapper rail *(Rallus longirostris yumanensis)*	Endangered	No	Yes	32 FR 4001, 03-11-67; 48 FR 34182, 07-27-83	Water bird with long legs, short tail, and long, slender, decurved bill. Mottled brown on gray on its rump. Flanks and undersides are dark gray with narrow verticle stripes producing a barring effect.	less than 4,500	Fresh water and brackish marches with dense emergent riparian vegetation.
Mountain plover (*Charadrius montanus)*	Proposed Threatened	No	No	64 FR 7587, 02-16-99	Wading bird; compactly built; in breeding season with white forehead and line over the eye; contrasting with dark crown; nondescript in winter. Voice is a low, variable whistle.	varies	Open arid plains, short-grass prairies, and cultivated form.
Acuna Cactus *(Echinomastus erectocentrus acunensis)*	Candidate	No	No	---------	Less than 12-inches high spine clusters borne on tubercles each with a groove on the upper surface. Two to three central spines and 12 radial spines. Flowers: pink to purple.	1,300 – 2,000	Well-drained knolls and gravel ridges in Sonoran desertscrub.
Yellow-billed cuckoo *(Coccyzus americanus)*	Candidate	No	No	66 FR 38611, 07-25-01	Medium-sized bird with a slender, long-tailed profile, and slightly down-curved bill, which is blue-black with yellow on the lower half. Plumage is grayish-brown above and white below with rufous primary flight feathers.	less than 6,500	Large blocks of riparian woodlands (cottonwood, willow, or tamarisk galleries).

APPENDIX B

AGFD AND USFWS COORDINATION LETTERS

THE STATE OF ARIZONA
GAME AND FISH DEPARTMENT
2221 WEST GREENWAY ROAD, PHOENIX, AZ 85023-4399
(602) 942-3000 • WWW.AZGFD.COM

January 16, 2001

RECEIVED
JAN 19 2001

Ms. Robin Llewellyn
SWCA Inc. Environmental Consultants
343 South Scott Ave.
Tucson, AZ 85701

Re: Special Status Species Information **Township 1 South, Range 13 East, Section 32; Township 2 South, Range 12 East Section 1; Township 2 South, Range 13 East Section 6: Drill Pads in Oak Flats Area, Tonto National Forest.**

Dear Ms. Llewellyn:

The Arizona Game and Fish Department (Department) has reviewed your letter, dated January 9, 2001, regarding special status species information associated with the above-referenced project area. The Department's Heritage Data Management System (HDMS) has been accessed and current records show that the special status species listed on the attachment have been documented as occurring in the project vicinity. In addition, this project does not occur in the vicinity of any designated or proposed Critical Habitats.

The Department's HDMS data are not intended to include potential distribution of special status species. Arizona is large and diverse with plants, animals, and environmental conditions that are ever changing. Consequently, many areas may contain species that biologists do not know about or species previously noted in a particular area may no longer occur there. Not all of Arizona has been surveyed for special status species, and surveys that have been conducted have varied greatly in scope and intensity.

Making available this information does not substitute for the Department's review of project proposals, and should not decrease our opportunities to review and evaluate new project proposals and sites. The Department is also concerned about other resource values, such as other wildlife, including game species, and wildlife-related recreation. The Department would appreciate the opportunity to provide an evaluation of impacts to wildlife or wildlife habitats associated with project activities occurring in the subject area, when specific details become available.

If you have any questions regarding the attached species list, please contact me at (602) 789-3618. General status information and county distribution lists for special status species are also available on our web site at http://www.azgfd.com/frames/fishwild/hdms_site/Home.htm.

Sincerely,

Sabra S. Schwartz
Heritage Data Management System, Coordinator

SSS:ss

Attachment

cc: Bob Broscheid, Project Evaluation Program Supervisor
Russ Haughey, Habitat Program Manager, Region VI

AGFD# 01-09-01 (09)

Special Status Species within 5 miles of T1S,R13E Sec 32; T2S,R12E Sec 1; T2S,R13E Sec 6

Arizona Game and Fish Department, Heritage Data Management System

January 16, 2001

Scientific Name	Common Name	ESA	USFS	BLM	WSCA	NPL
AGAVE MURPHEYI	HOHOKAM AGAVE	SC	S	S		HS
ECHINOCEREUS TRIGLOCHIDATUS VAR ARIZONICUS	ARIZONA HEDGEHOG CACTUS	LE	S			HS
GOPHERUS AGASSIZII (SONORAN POPULATION)	SONORAN DESERT TORTOISE	SC			WC	
MAMMILLARIA VIRIDIFLORA	VARIED FISHHOOK CACTUS					SR
NYCTINOMOPS FEMOROSACCUS	POCKETED FREE-TAILED BAT			S		
PHYLLORHYNCHUS BROWNI LUCIDUS	MARICOPA LEAFNOSE SNAKE		S			
POECILIOPSIS OCCIDENTALIS OCCIDENTALIS	GILA TOPMINNOW	LE			WC	
RANA YAVAPAIENSIS	LOWLAND LEOPARD FROG	SC	S		WC	
THAMNOPHIS EQUES MEGALOPS	MEXICAN GARTER SNAKE	SC	S		WC	
THELYPTERIS PUBERULA VAR SONORENSIS	ARAVAIPA WOOD FERN			S		

No Critical Habitats in project vicinity. AGFD # 01-09-01 (09); Proposed drill pads in the Oak Flats area.

THE STATE OF ARIZONA
GAME AND FISH DEPARTMENT
2221 WEST GREENWAY ROAD, PHOENIX, AZ 85023-4399
(602) 942-3000 • WWW.AZGFD.COM

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DEPUTY DIRECTOR
STEVE K. FERRELL

Mesa Office, Region VI, 7200 E. University, Mesa, Arizona 85207 (480) 981-9400

March 28, 2001

Globe Ranger District
Attn: Mr. Larry Widner
7680 S. Six Shooter Canyon Road
Globe, AZ 85501

Re: Proposed exploration-drilling program- Kennecott Exploration Company

Dear Mr. Widner,

The Department has received your notice on the proposed exploration-drilling program-Kennecott Exploration Company (file code 1950) and provides the following comments. Additionally, the Department has sent previous correspondence (1-16-01) to SWCA Inc. Environmental Consultants regarding the occurrence of special status species in the vicinity of the project for use in the biological evaluation. A copy of the letter is attached for your convenience. The common black-hawk (*Buteogallus anthracinus*) needs to be added to the species occurrence list within the project area and is classified as "sensitive" by the Regional Forester when occurring on lands managed by the U.S.D.A. Forest Service. The Department recommends that these species be considered in the planning and implementation of the proposed project.

The project area is surrounded by a diverse habitat transitioning between Sonoran Desertscrub and Interior Chaparral (Brown and Lowe, 1980). A number of important game species inhabit the surrounding area including javelina, whitetail and mule deer, along with numerous small game species such as Gambel quail, mourning and white-winged dove. Ringtail, coati mundi, mountain lion, bobcat and black bear also commonly occur in the area. A diverse array of non-game species including birds, reptiles, and mammals can also be found. The project area also contains several intermittent drainages and Rancho Rio Creek, all of which are flowing right now. The stock ponds in the area provide a water source that many species may rely on. Increased project related activities could disturb the use of these waters temporarily or permanently by wildlife.

Chaparral and Sonoran desert habitats are categorized as Resource Category III as defined in the Department's Wildlife and Wildlife Habitat Compensation Guidelines (Arizona Game and Fish Department Operating Manual, I2.3). Anticipated losses to Category III habitats are to be compensated by replacement of habitat values in-kind, or by substitution of high

value habitat types, or by increased management of replacement habitats, so that no net loss occurs. If the project remains in the previously disturbed areas for drill pad sites A,B,C,D, and F the Department does not expect any new significant loss to wildlife habitat, however increased human/mechanical activity will impact wildlife use of surrounding areas. The Department is concerned with the location of drill pad G within the Rio Rancho Creek drainage. Currently this creek is flowing, and is a tributary into the Devils Canyon drainage. Although surface flow may be intermittent and/or seasonal this drainage is a significant source of water for wildlife at times, and provides excellent habitat and travel corridors for many species. The Department recommends that an alternate drill pad site be selected to avoid impacts to this creek. In the event that the disturbance cannot be avoided suitable mitigation should be developed.

Potential mitigation for loss of habitat could include the following:

- Stabilizing water supplies for wildlife use by the creation of new water sources or the improvement of surrounding vegetation to increase habitat value for native wildlife. Increasing the value of nearby habitat could lessen the chance for human/wildlife interactions by creating high quality habitat areas away from the project area.

The Department has the following additional concerns:

- The Department recommends that surveys for the previously mentioned special status species be conducted prior to any future project expansion. Guidelines for Handling Sonoran Desert Tortoises are attached for your reference should they be encountered during the operation of the proposed project.
- If water for the operation involves groundwater pumping or use of existing surface waters the Department has concerns about impacts to springs, creeks, established stock ponds and their associated wildlife habitat. An environmental assessment and the Plan of Operations should adequately address the sources, methods and amounts of water delivery necessary for the operation and any potential impacts, along with alternatives to avoid dewatering surface waters in the area.
- The Department has concerns with the closure of FS #2474. This road provides the only access to approximately 6 miles of remote backcountry and is used extensively by four-wheel driving enthusiasts, rock climbers, hikers, hunters, and the current livestock operator. The Department recommends that it remain open for recreationists and hunter access.

- Make assurances that soil stabilization methods are implemented to control erosion related to project activities and prevent transport into surrounding watershed during high rainfall events.

- The Department is concerned with the potential threat that contaminants from the operation of project related equipment and/or drilling activities may pose to wildlife populations including, terrestrial, avian, and any aquatic species susceptible in the project area and Rio Rancho Creek drainage. The drill pad sites are located directly adjacent to several drainages and stock ponds in the area. Potential impacts should be adequately addressed in the environmental assessment; operational plan and reclamation plan to include provisions for their containment and inaccessibility.

- Since the development will be impacting areas that could be defined as "Waters of the United States" pursuant to the Clean Water Act, a Section 404 Permit should be applied for through the U.S. Army Corps of Engineers before any ground disturbance in these areas occurs.

- All trenches, pits and holes should be designed or covered in such a manner as to avoid the entrapment or loss of wildlife (including the small pits for storage of drilling mud).

- The Department recommends that only native herbaceous and woody plants indigenous to the project area be used for reclamation efforts. Transplant native trees and shrubs from the project site if the vegetation will be destroyed. Removal of native vegetation should be limited to the minimum amount possible. The Department recommends relocation of plant species, particularly cacti, protected under the Arizona Native Plant Law, ARS Title 3, Chapter 7, that occur within the project area to an appropriate revegetation site.

- The new segment of road created for a possible new site G should be located outside of desert washes and reclamation upon project completion should restore the area to natural landscape.

- The Department would like to request a copy of the operational and reclamation plans as soon as they are available.

Thank you for the opportunity to provide these comments. We look forward to future communications regarding this proposal. If there are any questions regarding these comments, please call Dana Bayer at (480) 981-9400; Ext. 229.

Sincerely,

Dana Bayer

Dana Bayer
Habitat Specialist, Region VI

Mr. Widner
3-28-01
Page 4

DB:db

Cc: Russ Haughey, Habitat Program Manager
Rod Lucas, Region VI Supervisor
Bob Broscheid, Project Evaluations Supervisor

Enclosures

GUIDELINES FOR HANDLING SONORAN DESERT TORTOISES ENCOUNTERED ON DEVELOPMENT PROJECTS

Arizona Game and Fish Department
Revised August 7, 1996

The Arizona Game and Fish Department (Department) has developed the following guidelines to reduce potential impacts to desert tortoises, and to promote the continued existence of tortoises throughout the state.

Desert tortoises of the Sonoran population are those occurring south and east of the Colorado River. Tortoises encountered on short-term projects (less than one week) and not in a burrow, should be moved out of harm's way to adjacent appropriate habitat. If an occupied burrow is determined to be in jeopardy of destruction, the tortoise should be relocated to the nearest appropriate alternate burrow or other appropriate shelter, as determined by a qualified biologist. Tortoises should be moved less than 48 hours in advance of the habitat disturbance so they do not return to the area in the interim. Tortoises should be moved quickly, kept in an upright position at all times and placed in the shade. Separate disposable gloves should be worn for each tortoise handled to avoid potential transfer of disease between tortoises. Tortoises must not be moved if the ambient air temperature exceeds 105 degrees fahrenheit unless an alternate burrow is available or the tortoise is in imminent danger.

A tortoise should be moved no further than necessary, not to exceed 1000 feet from its original location. If a release site, or alternate burrow, is unavailable within 1000 feet and ambient air temperature exceeds 105 degrees fahrenheit, the Department should be contacted to place the tortoise into a Department-regulated desert tortoise adoption program. Tortoises salvaged from projects which result in substantial permanent habitat loss (e.g. housing and highway projects), or those requiring removal during long-term (longer than one week) construction projects, will also be placed in desert tortoise adoption programs. *Managers of projects likely to affect desert tortoises should obtain a scientific collecting permit from the Department to facilitate temporary possession of tortoises.* Likewise, if large numbers of tortoises (>5) are expected to be displaced by a project, the project manager should contact the Department for guidance and/or assistance.

Please keep in mind the following points:

- These guidelines do not apply to the Mohave population of desert tortoises (north and west of the Colorado River). Mohave desert tortoises are specifically protected under the Endangered Species Act, as administered by the U.S. Fish and Wildlife Service.

- These guidelines are subject to revision at the discretion of the Department. We recommend that the Department be contacted during the planning stages of any project that may affect desert tortoises.

- Take, possession, or harassment of a desert tortoise is prohibited by state law. Unless specifically authorized by the Department, or as noted above, project personnel should avoid disturbing any tortoise.

RAC:NLO:rc

United States Department of the Interior
U.S. Fish and Wildlife Service
2321 West Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951
Telephone: (602) 640-2720 FAX: (602) 640-2730

In Reply Refer To:
AESO/SE
2-21-01-I-115

January 16, 2001

Mr. Robin Llewellyn, Biologist
SWCA Inc. Environmental Consultants
343 South Scott Avenue
Tucson, Arizona 85701

RE: Proposed Drill Pads in Oak Flats (S32, T1S, R13E; S1, T2S, R12E; and S6, T2S, R13E)

Dear Mr. Llewellyn:

This letter responds to your January 10, 2001, request for an inventory of threatened or endangered species, or those that are proposed to be listed as such under the Endangered Species Act of 1973, as amended (Act), which may potentially occur in your project area (Pinal County). The enclosed list may include candidate species as well. We hope the enclosed county list of species will be helpful. In future communications regarding this project, please refer to consultation number 2-21-01-I-115.

The enclosed list of the endangered, threatened, proposed, and candidate species includes all those potentially occurring anywhere in the county, or counties, where your project occurs. Please note that your project area may not necessarily include all or any of these species. The information provided includes general descriptions, habitat requirements, and other information for each species on the list. Also on the enclosed list is the Code of Federal Regulations (CFR) citation for each list and is available at most public libraries. This information should assist you in determining which species may or may not occur within your project area. Site-specific surveys could also be helpful and may be needed to verify the presence or absence of a species or its habitat as required for the evaluation of proposed project-related impacts.

Endangered and threatened species are protected by Federal law and must be considered prior to project development. If the action agency determines that listed species or critical habitat may be adversely affected by a federally funded, permitted, or authorized activity, the action agency must request formal consultation with the Service. If the action agency determines that the planned action may jeopardize a proposed species or destroy or adversely modify proposed critical habitat, the action agency must enter into a section 7 conference with the Service. Candidate species are those which are being considered for addition to the list of threatened or endangered species. Candidate species are those for which there is sufficient information to support a proposal for listing. Although candidate species have no legal protection under the Act, we

recommend that they be considered in the planning process in the event that they become listed or proposed for listing prior to project completion.

If any proposed action occurs in or near areas with trees and shrubs growing along watercourses, known as riparian habitat, the Service recommends the protection of these areas. Riparian areas are critical to biological community diversity and provide linear corridors important to migratory species. In addition, if the project will result in the deposition of dredged or fill materials into waterways or excavation in waterways, we recommend you contact the Army Corps of Engineers which regulates these activities under Section 404 of the Clean Water Act.

Additional information regarding critical habitat designation for the cactus ferruginous pygmy-owl is also enclosed.

The State of Arizona protects some plant and animal species not protected by Federal law. We recommend you contact the Arizona Game and Fish Department and the Arizona Department of Agriculture for State-listed or sensitive species in your project area.

The Service appreciates your efforts to identify and avoid impacts to listed and sensitive species in your project area. If we may be of further assistance, please feel free to contact Tom Gatz.

Sincerely,

Jacqueline Hanson

David L. Harlow
Field Supervisor

Enclosures

cc: John Kennedy, Habitat Branch, Arizona Game and Fish Department, Phoenix, AZ

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: PINAL

10/25/2000

1) LISTED

TOTAL= 13

NAME: ARIZONA HEDGEHOG CACTUS *ECHINOCEREUS TRIGLOCHIDIATUS ARIZONICUS*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: No CFR: 44 FR 61556,10-15-1979

DESCRIPTION: DARK GREEN CYLINDROID 2.5-12 INCHES TALL, 2-10 INCHES IN DIAMETER, SINGLE OR IN CLUSTERS. 1-3 GRAY OR PINKISH CENTRAL SPINES LARGEST DEFLEXED AND 5-11 SHORTER RADIAL SPINES. FLOWER: BRILLIANT RED, SIDE OF STEM IN APRIL- MAY

ELEVATION RANGE: 3700-5200 FT.

COUNTIES: MARICOPA, GILA, PINAL

HABITAT: ECOTONE BETWEEN INTERIOR CHAPPARAL AND MADREAN EVERGREEN WOODLAND

OPEN SLOPES, IN NARROW CRACKS BETWEEN BOULDERS, AND IN UNDERSTORY OF SHRUBS. THIS VARIETY IS BELIEVED TO INTERGRADE AT THE EDGES OF ITS DISTRIBUTION WITH VARIETIES MELANCANTHUS AND NEOMEXICANUS CAUSING SOME CONFUSION IN IDENTIFICATION.

NAME: NICHOL'S TURK'S HEAD CACTUS *ECHINOCACTUS HORIZONTHALONIUS VAR NICHOLII*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: No CFR: 44 FR 61927, 10-26-1979

DESCRIPTION: BLUE-GREEN TO YELLOWISH-GREEN, COLUMNAR, 18 INCHES TALL, 8 INCHES IN DIAMETER. SPINE CLUSTERS HAVE 5 RADIAL & 3 CENTRAL SPINES; ONE DOWNWARD SHORT; 2 SPINES UPWARD AND RED OR BASALLY GRAY. FLOWER:PINK FRUIT:WOOLLY WHITE

ELEVATION RANGE: 2400-4100 FT.

COUNTIES: PINAL, PIMA

HABITAT: SONORAN DESERTSCRUB

FOUND IN UNSHADED MICROSITES IN SONORAN DESERTSCRUB ON DISSECTED ALLUVIAL FANS AT THE FOOT OF LIMESTONE MOUNTAINS AND ON INCLINED TERRACES AND SADDLES ON LIMESTONE MOUNTAINSIDES.

NAME: LESSER LONG-NOSED BAT *LEPTONYCTERIS CURASOAE YERBABUENAE*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 53 FR 38456, 09-30-88

DESCRIPTION: ELONGATED MUZZLE, SMALL LEAF NOSE, AND LONG TONGUE. YELLOWISH BROWN OR GRAY ABOVE AND CINNAMON BROWN BELOW. TAIL MINUTE AND APPEARS TO BE LACKING. EASILY DISTURBED.

ELEVATION RANGE: <6000 FT.

COUNTIES: COCHISE, PIMA, SANTA CRUZ, GRAHAM, PINAL, MARICOPA

HABITAT: DESERT SCRUB HABITAT WITH AGAVE AND COLUNMNAR CACTI PRESENT AS FOOD PLANTS

DAY ROOSTS IN CAVES AND ABANDONED TUNNELS. FORAGES AT NIGHT ON NECTAR, POLLEN, AND FRUIT OF PANICULATE AGAVES AND COLUMNAR CACTI. THIS SPECIES IS MIGRATORY AND IS PRESENT IN ARIZONA , USUALLY FROM APRIL TO SEPTMBER AND SOUTH OF THE BORDER THE REMAINDER OF THE YEAR.

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: PINAL

10/25/2000

NAME: DESERT PUPFISH *CYPRINODON MACULARIUS*

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: Yes CFR: 51 FR 10842, 03-31-1986

DESCRIPTION: SMALL (2 INCHES) SMOOTHLY ROUNDED BODY SHAPE WITH NARROW VERTICAL BARS ON THE SIDES. BREEDING MALES BLUE ON HEAD AND SIDES WITH YELLOW ON TAIL. FEMALES & JUVENILES TAN TO OLIVE COLORED BACK AND SILVERY SIDES.

ELEVATION RANGE: <5000 FT.

COUNTIES: LA PAZ, PIMA, GRAHAM, MARICOPA, PINAL, YAVAPAI, SANTA CRUZ

HABITAT: SHALLOW SPRINGS, SMALL STREAMS, AND MARSHES. TOLERATES SALINE & WARM WATER

CRITICAL HABITAT INCLUDES QUITOBAQUITO SPRING, PIMA COUNTY, PORTIONS OF SAN FELIPE CREEK, CARRIZO WASH, AND FISH CREEK WASH, IMPERIAL COUNTY, CALIFORNIA. TWO SUBSPECIES ARE RECOGNIZED: DESERT PUPFISH (C. m. macularis) AND QUITOBAQUITO PUPFISH (C. m. eremus).

NAME: GILA TOPMINNOW *POECILIOPSIS OCCIDENTALIS OCCIDENTALIS*

STATUS: ENDANGERED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 32 FR 4001, 03-11-1967

DESCRIPTION: SMALL (2 INCHES), GUPPY-LIKE, LIVE BEARING, LACKS DARK SPOTS ON ITS FINS. BREEDING MALES ARE JET BLACK WITH YELLOW FINS.

ELEVATION RANGE: <4500 FT.

COUNTIES: GILA, PINAL, GRAHAM, YAVAPAI, SANTA CRUZ, PIMA, MARICOPA, LA PAZ

HABITAT: SMALL STREAMS, SPRINGS, AND CIENEGAS VEGETATED SHALLOWS

SPECIES HISTORICALLY OCCURRED IN BACKWATERS OF LARGE RIVERS BUT IS CURRENTLY ISOLATED TO SMALL STREAMS AND SPRINGS

NAME: LOACH MINNOW *TIAROGA COBITIS*

STATUS: THREATENED CRITICAL HAB Yes RECOVERY PLAN: Yes CFR: 51 FR 39468, 10-28-1986; 59 FR 10898, 03-08-1994;

DESCRIPTION: SMALL (<3 INCHES LONG) SLENDER, ELONGATED FISH, OLIVE COLORED WITH DIRTY WHITE SPOTS AT THE BASE OF THE DORSAL AND CAUDAL FINS. BREEDING MALES VIVID RED ON MOUTH AND BASE OF FINS

ELEVATION RANGE: <8000 FT.

COUNTIES: PINAL, GRAHAM, GREENLEE, GILA, APACHE, NAVAJO, *YAVAPAI, *COCHISE, *PIMA

HABITAT: BENTHIC SPECIES OF SMALL TO LARGE PERENNIAL STREAMS WITH SWIFT SHALLOW WATER OVER COBBLE& GRAVEL. RECURRENT FLOODING AND NATURAL HYDROGRAPH IMPORTANT.

[redacted]

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: PINAL

10/25/2000

NAME: RAZORBACK SUCKER *XYRAUCHEN TEXANUS*

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: Yes CFR: 55 FR 21154, 05-22-1990; 59 FR 13374, 03-21-1994

DESCRIPTION: LARGE (UP TO 3 FEET AND UP TO 16 POUNDS) LONG, HIGH SHARP-EDGED KEEL-LIKE HUMP BEHIND THE HEAD. HEAD FLATTENED ON TOP. OLIVE-BROWN ABOVE TO YELLOWISH BELOW.

ELEVATION RANGE: <6000 FT.

COUNTIES: GREENLEE, MOHAVE, PINAL, YAVAPAI, YUMA, LA PAZ, MARICOPA (REFUGIA), GILA, COCONINO, GRAHAM

HABITAT: RIVERINE & LACUSTRINE AREAS, GENERALLY NOT IN FAST MOVING WATER AND MAY USE BACKWATERS

SPECIES IS ALSO FOUND IN HORSESHOE RESERVOIR (MARICOPA COUNTY) CRITICAL HABITAT INCLUDES THE 100

[redacted]

NAME: SPIKEDACE *MEDA FULGIDA*

STATUS: THREATENED CRITICAL HAB Yes RECOVERY PLAN: Yes CFR: 51 FR 23769,07-01-1986; 59 FR 10906, 03-08-1994;

DESCRIPTION: SMALL (<3 INCHES) SLIM WITH SLIVERY SIDES & "SPINE" ON DORSAL FIN. BREDING MALES BRASSY GOLDEN COLOR

ELEVATION RANGE: <6000 FT.

COUNTIES: GRAHAM, PINAL, GREENLEE, YAVAPAI, APACHE*, COCHISE*, GILA*, NAVAJO*, PIMA*

HABITAT: MODERATE TO LARGE PERENNIAL STREAMS WITH GRAVEL COBBLE SUBSTRATES AND MODERATE TO SWIFT VELOCITIES OVER SAND AND GRAVEL SUBSTRATES. RECURRENT FLOODING AND NATURAL

[redacted]

NAME: BALD EAGLE *HALIAEETUS LEUCOCEPHALUS*

STATUS: THREATENED CRITICAL HAB No RECOVERY PLAN: Yes CFR: 60 FR 35999, 07-12-95

DESCRIPTION: LARGE, ADULTS HAVE WHITE HEAD AND TAIL. HEIGHT 28 - 38"; WINGSPAN 66 - 96". 1-4 YRS DARK WITH VARYING DEGREES OF MOTTLED BROWN PLUMAGE. FEET BARE OF FEATHERS.

ELEVATION RANGE: VARIES FT.

COUNTIES: YUMA, LA PAZ, MOHAVE, YAVAPAI, MARICOPA, PINAL, COCONINO, NAVAJO, APACHE, SANTA CRUZ, PIMA, GILA, GRAHAM, COCHISE

HABITAT: LARGE TREES OR CLIFFS NEAR WATER (RESERVOIRS, RIVERS AND STREAMS) WITH ABUNDANT PREY

SOME BIRDS ARE NESTING RESIDENTS WHILE A LARGER NUMBER WINTERS ALONG RIVERS AND RESERVOIRS. AN ESTIMATED 200 TO 300 BIRDS WINTER IN ARIZONA. ONCE ENDANGERED (32 FR 4001, 03-11-1967; 43 FR 6233, 02-14-78) BECAUSE OF REPRODUCTIVE FAILURES FROM PESTICIDE POISONING AND LOSS OF HABITAT, THIS SPECIES WAS DOWN LISTED TO THREATENED ON AUGUST 11, 1995. ILLEGAL SHOOTING, DISTURBANCE, LOSS OF HABITAT CONTINUES TO BE A PROBLEM. SPECIES HAS BEEN PROPOSED FOR DELISTING (64 FR 36454) BUT STILL RECEIVES FULL PROTECTION UNDER ESA.

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: PINAL

10/25/2000

NAME: CACTUS FERRUGINOUS PYGMY-OWL *GLAUCIDIUM BRASILIANUM CACTORUM*

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: No CFR: 62 FR 10730, 3-10-97

DESCRIPTION: SMALL (APPROX. 7"), DIURNAL OWL REDDISH BROWN OVERALL WITH CREAM-COLORED BELLY STREAKED WITH REDDISH BROWN. SOME INDIVIDUALS ARE GRAYISH BROWN

ELEVATION RANGE: <4000 FT.

COUNTIES: MARICOPA, YUMA, SANTA CRUZ, GRAHAM, GREENLEE, PIMA, PINAL, GILA, COCHISE

HABITAT: MATURE COTTONWOOD/WILLOW, MESQUITE BOSQUES, AND SONORAN DESERTSCRUB

[redacted]

NAME: MEXICAN SPOTTED OWL *STRIX OCCIDENTALIS LUCIDA*

STATUS: THREATENED CRITICAL HAB Yes RECOVERY PLAN: Yes CFR: 56 FR 14678, 04-11-91

DESCRIPTION: MEDIUM SIZED WITH DARK EYES AND NO EAR TUFTS. BROWNISH AND HEAVILY SPOTTED WITH WHITE OR BEIGE.

ELEVATION RANGE: 4100-9000 FT.

COUNTIES: MOHAVE, COCONINO, NAVAJO, APACHE, YAVAPAI, GRAHAM, GREENLEE, COCHISE, SANTA CRUZ, PIMA, PINAL, GILA, MARICOPA

HABITAT: NESTS IN CANYONS AND DENSE FORESTS WITH MULTI-LAYERED FOLIAGE STRUCTURE

GENERALLY NESTS IN OLDER FORESTS OF MIXED CONIFER OR PONDERSA PINE/GAMBEL OAK TYPE. IN CANYONS, AND USE VARIETY OF HABITATS FOR FORAGING. SITES WITH COOL MICROCLIMATES APPEAR TO BE OF IMPORTANCE OR ARE PREFERED. CRITICAL HABITAT WAS REMOVED IN 1998 BUT RE-PROPOSED IN JULY2000 FOR APACHE, COCHISE, COCONINO, GILA, GRAHAM, GREENLEE, MARICOPA, MOHAVE, NAVAJO, PIMA, PINAL, SANTA CRUZ, AND YAVAPAI COUNTIES.

NAME: SOUTHWESTERN WILLOW FLYCATCHER *EMPIDONAX TRAILLII EXTIMUS*

STATUS: ENDANGERED CRITICAL HAB Yes RECOVERY PLAN: No CFR: 60 FR 10694, 02-27-95

DESCRIPTION: SMALL PASSERINE (ABOUT 6") GRAYISH-GREEN BACK AND WINGS, WHITISH THROAT, LIGHT OLIVE-GRAY BREAST AND PALE YELLOWISH BELLY. TWO WINGBARS VISIBLE. EYE-RING FAINT OR ABSENT.

ELEVATION RANGE: <8500 FT.

COUNTIES: YAVAPAI, GILA, MARICOPA, MOHAVE, COCONINO, NAVAJO, APACHE, PINAL, LA PAZ, GREENLEE, GRAHAM, YUMA, PIMA, COCHISE, SANTA CRUZ

HABITAT: COTTONWOOD/WILLOW & TAMARISK VEGETATION COMMUNITIES ALONG RIVERS & STREAMS

[redacted]

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: PINAL

10/25/2000

NAME: YUMA CLAPPER RAIL *RALLUS LONGIROSTRIS YUMANENSIS*

STATUS: ENDANGERED CRITICAL HAB. No RECOVERY PLAN: Yes CFR: 32 FR 4001, 03-11-67; 48 FR 34182, 07-27-83

DESCRIPTION: WATER BIRD WITH LONG LEGS AND SHORT TAIL. LONG SLENDER DECURVED BILL. MOTTLED BROWN ON GRAY ON ITS RUMP. FLANKS AND UNDERSIDES ARE DARK GRAY WITH NARROW VERTICAL STRIPES PRODUCING A BARRING EFFECT.

ELEVATION RANGE: <4500 FT.

COUNTIES: YUMA, LA PAZ, MARICOPA, PINAL, MOHAVE

HABITAT: FRESH WATER AND BRACKISH MARSHES

SPECIES IS ASSOCIATED WITH DENSE EMERGENT RIPARIAN VEGETATION. REQUIRES WET SUBSTRATE (MUDFLAT, SANDBAR) WITH DENSE HERBACEOUS OR WOODY VEGETATION FOR NESTING AND FORAGING. CHANNELIZATION AND MARSH DEVELOPMENT ARE PRIMARY SOURCES OF HABITAT LOSS.

LISTED, PROPOSED, AND CANDIDATE SPECIES FOR THE FOLLOWING COUNTY: PINAL

10/25/2000

2) PROPOSED TOTAL= 1

NAME: MOUNTAIN PLOVER *CHARADRIUS MONTANUS*

STATUS: PROPOSED THREATENED CRITICAL HAB No RECOVERY PLAN: No CFR: 64 FR 7587; 02-16-1999

DESCRIPTION: IN BREEDING SEASON WITH WHITE FOREHEAD AND LINE OVER THE EYE; CONTRASTING WITH DARK CROWN; NONDESCRIPT IN WINTER. VOICE IS LOW, VARIABLE WHISTLE.

ELEVATION RANGE: VARIABLE FT.

COUNTIES: YUMA, PIMA, COCHISE, PINAL, APACHE

HABITAT: OPEN ARID PLAINS, SHORT-GRASS PRAIRIES, AND CULTIVATED FORMS.

SPECIES PRIMARILY FOUND IN ROCKY MOUNTAIN STATES FROM CANADA TO MEXICO. AZ PRIMARILY PROVIDES WITNERING HABITAT. BREEDING HAS BEEN DOCUMENTED, BUT IS RARE, AND IS LIKELY RESTRICTED TO TRIBAL AND STATE LANDS IN APACHE COUNTY.

APPENDIX C

SITE
VICINITY
PLANT
LIST

SITE VICINITY PLANT LIST

DOMINANT SPECIES

- *Quercus turbinella*-Scrub oak
- *Arcostaphylos pungens*-Poiintleaf manzanita
- *Berberis haematocarpa*-Red barberry

OTHER COMMON SPECIES

- *Quercus emoryi*-Emory oak
- *Rhamnus crocea*-Hollyleaf buckthorn
- *Rhus trilobata*-Skunk bush
- *Cercocarpus betuloides*-Birchleaf mt. mahogany
- *Dodonaea viscosa*-Hop bush Juniper
- *Mimosa biuncifera*-Wait a minute bush
- *Mimosa dysocarpa*-Velvetpod mimosa
- *Nolina microcarpa*-Beargrass
- *Dasylirion wheeleri*-Sotol
- *Garrya wrightii*-Silk tassle
- *Yucca schottii*-Schott's yucca
- *Yucca baccata*-Banana yucca
- *Agave chrysantha*-Century plant
- *Ericameria laricifolia*-Turpentine bush
- *Lycium* sp.-Wolfberry
- *Eriogonum wrightii*-Wright buckwheat
- *Opuntia imbricata*-Tree cholla
- *Brickellia* sp.-Brickelbush

COMMON GRASS SPECIES

- *Bouteloua curtipendula*-Sideoats gramma
- *Muhlenbergia emersleyi*-Bullgrass
- *Schizachyrium cirratus*-Texas bluestem
- *Poa fendleriana*-Muttongrass
- *Aristida orcuttiana*-Bentawn
- *Aristida ternipes*-Spider aristida
- *Andropogon barbinodis*-Cane beardgrass

UNCOMMON SPECIES

- *Carnegiea gigantea*-Saguaro
- *Baccharis sarothroides*-Desert broom
- *Echinocereus fasciculatus*-Hedgehog
  var.*fasciculatus*
  var.*Bonkerae*
- *Opuntia spinosior*-Cane cholla
- *Opuntia engelmannii*-Engelmann prickly pear cactus
- *Opuntia chlorotica*-Pancake pear cactus
- *Juniperus deppeana*-Alligator juniper
- *Juniperus monosperma*-One-seed
- *Celtis reticulata*-Canyon hackberry
- *Salix gooddingii*-Goodding willow
- *Populus fremontii*-Cottonwood
- *Vitis arizonica*-Canyon grape

APPENDIX D

2004 ARIZONA HEDGEHOG CACTUS SURVEY
Federal Parcel, Pinal County, Arizona

Prepared for:

Resolution Copper Company

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Prepared by:

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DECEMBER 2004
Job No. 807.09

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Appendix B: Arizona Hedgehog Survey Data Sheets

EXECUTIVE SUMMARY

WestLand Resources, Inc. (WestLand) was retained by Resolution Copper Company (Resolution) to conduct a survey for Arizona hedgehog cactus (*Echinocereus triglochidiatus* var. *arizonicus;* ETA) on the approximately 1,224-hectare (3,025-acre) Federal Parcel (the Parcel). The Parcel is in the Tonto National Forest east of the town of Superior in Pinal County, Arizona.

Resolution proposes to obtain the Parcel by way of a land exchange. In support of this effort, WestLand has been conducting baseline resource investigations on the Parcel. The purpose of this survey was to identify existing locations of the ETA in accordance with established protocols and procedures.

Nine Arizona hedgehog cacti were found on the Parcel (1 plant per 136 hectares [336 acres]). The Arizona hedgehog cactus densities found on the Parcel are far less than those found in areas northeast of the Parcel for the Carlota project in 1992 and 1993. Arizona hedgehog cacti densities found in that area were 1 to 8 plants per hectare (2 to 20 plants per acre).

The predominant rock type on the Parcel east of Apache Leap is Apache Leap tuff, one of the geologic formations typically associated with Arizona hedgehog cactus habitat. This formation covers approximately 90 percent of the Parcel. No obvious reasons for the extremely low densities of the plant on the Parcel are apparent. However, the Apache Leap tuff is comprised of several layers with various degrees of welding which are visually differentiated by rock color. Some of these layers may provide a more suitable substrate for the Arizona hedgehog cactus than others, but no direct association was observed.

1. INTRODUCTION AND BACKGROUND

1.1 STATEMENT OF PURPOSE

WestLand Resources, Inc. (WestLand) was retained by Resolution Copper Company to conduct an Arizona hedgehog cactus (*Echinocereus triglochidiatus* var. *arizonicus;* ETA) survey on the approximately 1,224-hectare (3,025-acre) Federal Parcel (the Parcel), located east of the town of Superior in Pinal County, Arizona. [redacted] The Parcel is currently public land, managed by the US Forest Service (USFS) within the Tonto National Forest.

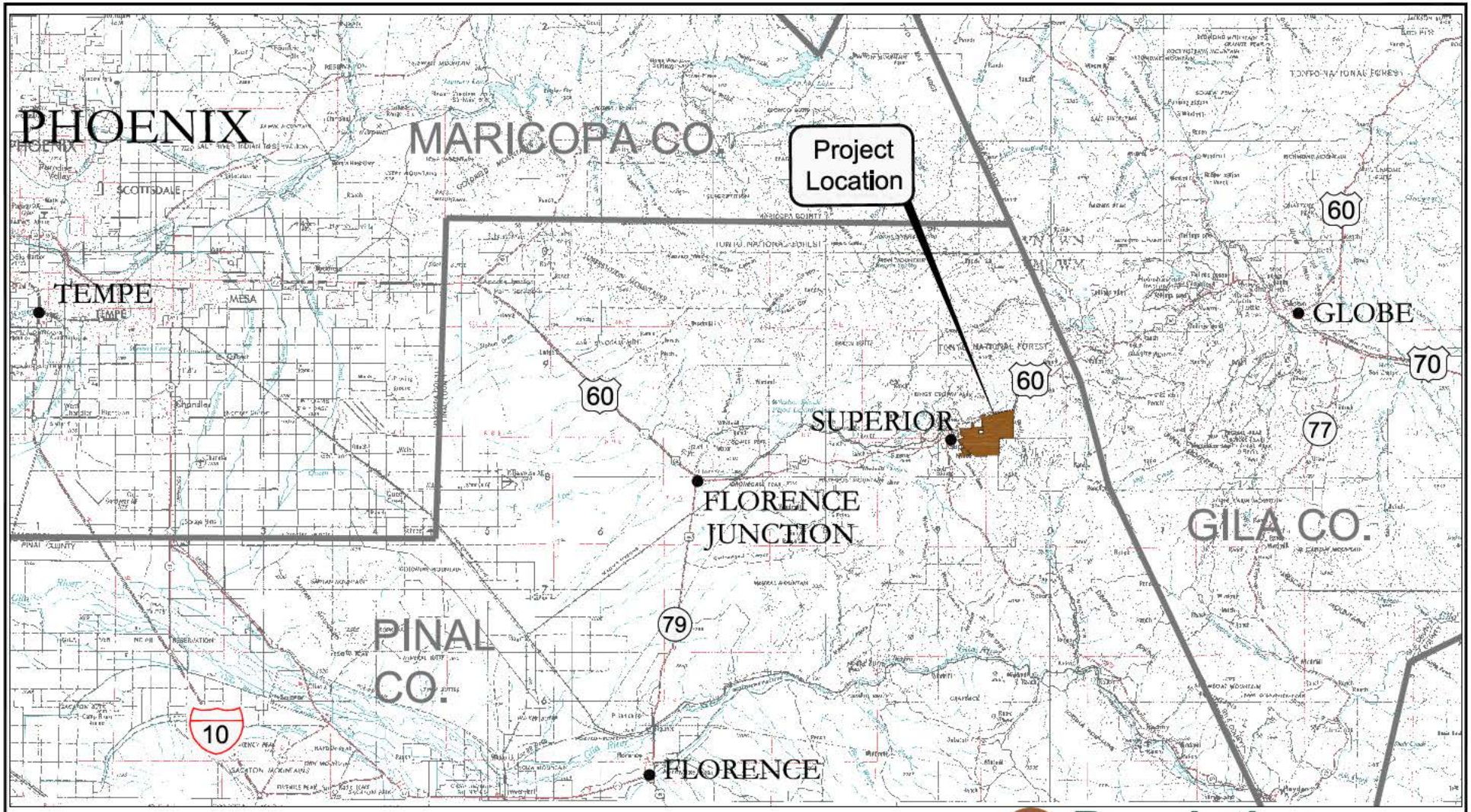
Resolution proposes to obtain the Parcel by way of a land exchange. In support of this effort, WestLand has been conducting baseline resource investigations on the Parcel. The purpose of this survey was to identify existing locations of the ETA in accordance with established survey protocols and procedures.

1.2 SITE DESCRIPTION

The Parcel is located in the Pinal Mountains within the Central Highlands Province, a transition zone between the Colorado Plateau and the Basin and Range Provinces. Elevation within the Parcel varies from approximately 900 to 1,500 meters (3,000 to 5,000 feet) above mean sea level. Over 90 percent of the area of the Parcel is covered by the Apache Leap tuff, the youngest consolidated geologic formation, which forms the cap of the Apache Leap escarpment on the western portion of the Parcel. Underlying units are volcanic and sedimentary rocks exposed at the foot of the Apache Leap escarpment. A late Tertiary/early Quaternary weakly consolidated gravel and conglomerate unit overlies the Apache Leap tuff in a small area on the eastern portion of the Parcel.

The soils associated with the Apache Leap tuff are classified as Lithic Torriorthents, and were formed as a residuum weathered from the tuff (Brown, 1994). These soils are shallow, gravelly, and strongly sloping to very steep soils and, consequently, are well drained.

The Parcel is dominated by plant species associated with Interior Chaparral (east of Apache Leap) and Sonoran Desertscrub biotic communities (west of Apache Leap), as described by Brown (1994). Relatively isolated patches of xeroriparian and mesoriparian vegetation are located throughout the Parcel around stock tanks and in association with ephemeral drainages, Rancho Rio Creek, and Queen Creek.



Pinal County, Arizona
Mesa 1:250,000 USGS Map

0 6.5 13 KM

Approx. Scale 1" = 13 KILOMETERS

N

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Resolution Copper Company

2004 ARIZONA HEDGEHOG CACTUS SURVEY, FEDERAL PARCEL

VICINITY MAP
Figure 1

m:\projects\807.09\eta\RS-VICINITY-REGIONAL.DWG 6-01-04

1.3 SUMMARY OF PREVIOUS SURVEYS CONDUCTED IN THE PARCEL VICINITY

Several previous surveys for ETA have been conducted on or near the Parcel:

- The broadest scope was covered by Cedar Creek Associates (in USFS 1996), in which a 100-percent survey of the nearby Carlota Mine site (13 kilometers [9 miles] northeast of the Parcel) was expanded to include a review of all data pertaining to the species. The initial survey of the Carlota site identified 1150 individual plants, and the majority of the plants were found in the "Dry-slope Desert Brush community occurring on the Apache Leap Tuff (also known as dacite)." Combining these findings with studies of three other areas, Cedar Creek Associates concluded that the ETA "occupies an area of about 18,900 acres (or nearly 30 square miles)" and that the "preponderance of existing data strongly suggest these [Apache Leap Tuff and Schultze granite] are preferred substrates for Arizona hedgehog." Furthermore, "[g]iven these sources of data, the average density of Arizona hedgehog within the Schultze granite and dacite formations is 64.05 and 5.72 individuals per acre, respectively."
- A biological evaluation of six drill pad sites within the Parcel, conducted by SWCA, Inc. in 2001, identified no ETA within the 22-acre study area along [redacted]. The geologic formation underlying the study area was Apache Leap Tuff.
- A biological evaluation of six additional drill pad sites within the Parcel, conducted by WestLand in 2001, identified no ETA within the study area near the previously studied drill pad sites. Again, the geologic formation underlying this study area was Apache Leap Tuff.
- A biological evaluation of one drill pad site within the Parcel, conducted by WestLand in 2002, identified no ETA within the study area. This site was also near the previously studied drill pad sites, and also located atop the Apache Leap Tuff.
- An intensive survey of a 121-hectare (300-acre) area adjoining the Parcel on the north side of US 60 was conducted by WestLand in late 2002 and early 2003. Eighty-four plants were found on that site (plus one plant observed on the south side of US 60), which is also located on Apache Leap Tuff.
- Additional broad surveys for ETA on the Parcel were conducted by WestLand in the spring of 2003. Utilizing the spring flowering period to advantage, this work consisted of wide-area pedestrian surveys searching for the distinctive scarlet red flowers of the ETA. One plant was found near Oak Flat Campground, and one along Queen Creek on a steep cliff.

Based on these results, it appears that ETA is correlated with Apache Leap Tuff on the north side of US 60 (off-site) but, as of the end of 2003, only one ETA was found south of US 60. As stated in WestLand (2003b), "[n]o obvious reasons for the veritable absence of ETA on the south side of US 60 are apparent."

4 SCR S AS R A A HABA

Prior to conducting the field surveys, WestLand personnel conducted a literature and file search to obtain current information regarding the range and habitat requirements of ETA. The following sections provide a species account for the ETA.

1.4.1 Description

Representative Arizona hedgehog cactus (*Echinocereus triglochidiatus arizonicus)* on the Parcel.

ETA was first discovered and described in the mid-1800s in the mountains and canyons between Globe and Superior, Arizona.

ETA has dark green cylindroid stems that occur singly or in clusters of a few stems. Large, robust stems range from 23 to 41cm (9.2 to 16.4 in.) high and 7.5 to 10.0 cm (3.0 to 4.0 in.) in diameter. Each stem has seven to 12 robust tuberculate ribs. ETA has one to three gray or pinkish central spines; the largest central spine is deflexed (points down). Its five to 11 radial spines are slightly curved. The accompanying photograph was taken of an ETA found on the Parcel (Cactus 3); this photograph shows the cactus' stem and spine characteristics. A unique characteristic of the *Echinocereus* genus is that the flowers burst through the sides of the stems, leaving scar tissue on the stem above the spine. ETA flowers are bright red (no bluish or lavender hues), which is the distinguishing feature from other hedgehog cacti found below 1,800 m (6,000 ft.) Flowers are produced on the upper third of stem ribs and are broad, about 5.0 cm (2.0 in.) in diameter and 7.4 cm (2.96 in.) long. Relative to other *Echinocereus*, ETA spines are shorter and more robust. One other *Echinocereus* species was encountered during our survey effort, *Echinocereus fasciculatus* (EF); however, the identity of the two species was not confused. In addition to the difference in spine length and width between these two *Echinocereus* species, two other considerable differences exist in the appearance of these the two plants; 1) EF has a dense coverage of spines compared to that of ETA, and 2) the EF flower color is pink to magenta but bright red in the ETA.

1.4.2 Status

ETA is listed as an endangered species under the federal Endangered Species Act without Critical Habitat by the US Fish and Wildlife Service (USFWS) (40 FR 61556; Oct. 15, 1979), as Highly Safeguarded by the State of Arizona (Arizona Native Plant Law, 1993), and as a USFS Sensitive species (USFS, 2003). ETA was listed as an endangered species because the limited geographic range of this plant increases its

vulnerability to threats from mining, off-road vehicle use, illegal collecting, and road and utility construction.

Controversy over the taxonomy of this species prevents the USFWS from developing a recovery plan or finalizing the draft taxonomy for the species. There are several populations of similar cacti growing in the mountains of the southwestern United States and in northern Mexico that are closely related to ETA. Up until the mid-1980s it was thought that there were eight different varieties of the species *Echinocereus triglochidiatus*, one of which is *arizonicus* or ETA. The other varieties have the same flower shape, color, and development (called a "claret-cup" flower because it is shaped like a claret wine goblet) but have different spine, stem and rib characteristics. It is assumed that all of the varieties were able to interbreed with one another because there are many populations that appear to be intermediate between two neighboring varieties.

At this point in time, there are three recognized varieties of the species *Echinocereus triglochidiatus*: *triglochidiatus, mojavensis*, and *arizonicus*. Recently, some botanists have suggested that the populations of hedgehog cactus growing in the mountains of Cochise County, Arizona, and southeast New Mexico are the same as *arizonicus* or ETA. In the past these populations have been called *E. triglochidiatus* var. *neomexicanus*. The Cochise County cacti are thought to be the same as *arizonicus* because they are "robust" (large stems) and the diameter of their spines is large ("thick-spined"). If these populations are indeed the same variety as *arizonicus*, then the geographic distribution of the Arizona hedgehog cactus may be considered far more widespread than if the populations are distinct. Ramifications of this to the listing status of the ETA, if the Cochise County cacti are ETA, are unclear.

1.4.3 Range and Habitat

ETA, as currently defined, is found in Pinal County in the vicinity of Dripping Springs, the Superstition and Mescal mountains, the highlands between Globe and Superior, and in Devils Canyon and Queen Creek along the Gila/Pinal County line. Known habitat requirements include open slopes or the understory of a more open canopy in cracks and crevices between boulders, rather than the dense shrub overstory of the Interior Chaparral biome dominant on the Parcel. The substrate that is known to support this species has geologic parent materials consisting of volcanic tuff, dacite, and granite.

The distribution of ETA within its range appears to be closely associated with four major rock types: Tertiary Apache Leap tuff (dacite), Cretaceous or Tertiary Schultze granite, Precambrian Apache Group Pioneer quartzites, and Precambrian Pinal schist. Cedar Creek Associates' observations of more than 1,000 specimens located during field surveys for the nearby Carlota Project indicate that ETA prefers stable rock formations such as the Apache Leap tuff and Schultze granite (Cedar Creek Associates, 1994). These rock types weather very slowly, forming stable ridges and outcrops, which provide opportunities for ETA to establish and grow. The remaining two rock types that are known to be associated with ETA are either poorly distributed within the known range of ETA (Pioneer quartzites) or weather more rapidly (Pinal schist) creating a soil substrate that is colonized by dense stands of vegetation and do not appear to be used by ETA to the same extent as the tuff or granite.

2. METHODS

A qualified WestLand field crew of three to five surveyors conducted an ETA survey of the Parcel on April 5 through 28, 2004. Survey methods employed by Westland for the ETA were based on previous cactus survey protocols that were designed in consultation with the USFWS and the USFS.

Two methods were used to survey the Parcel for ETA. Most of the Parcel was surveyed by observers walking parallel transects as described below. Due to the rugged nature of the geologic formations that occur within the Parcel, visual surveys of inaccessible cliff walls, opposing slopes, deep canyons, and outcroppings were conducted by glassing with 8x48 or 10x50 power binoculars. Binocular surveys, when necessary, were conducted from a point that offered the best view of the target area. The observer glassed the area in overlapping sweeps with the binoculars, choosing obvious landmarks to use as reference points for the sweeps. Figure 2 provides a map of the areas surveyed by the two methods.

On-ground survey transect widths were determined by the density of vegetation. Belts of no more than 25 meters (80 feet) in width (12.5 meters [40 feet] on each side) were surveyed by each observer. In dense stands of vegetation, transect widths were reduced to 10 meters (30 feet) in total width (or less) depending on transect site-specific conditions. Within each survey belt, observers walked in a zigzag pattern inspecting the ground surface to the front, sides, and rear as they progressed across the transect. In this manner, the effort was maximized to gain view of the ground surface. The line of observers moved at a pace set by the slowest member to avoid unnecessary duplication of effort and missing portions of the survey belt. To facilitate control, the outside observer maintained position of the transect with the aid of compass or hand-held GPS unit and/or tied flagging along his path to assist in the location of the adjacent sweep. Sweeps were organized to take advantage of topography, road cuts, or other features of the landscape to ensure efficient and accurate coverage of all portions of the delineated survey areas.

Upon finding an ETA, a more intensive search was conducted within a 100-meter (300-foot) radius surrounding the cactus. Field personnel recorded the number of stems, ribs, and spines, and the length of the tallest and shortest stems in inches. In addition, observations on location, habitat and elevation, slope, and aspect were recorded. These data, along with Universal Transverse Mercator (UTM) coordinates in North American Data 1927 (NAD 27), were recorded on the *Arizona Hedgehog Cactus Survey Data Sheet* for each cactus found on the Parcel .

3. RESULTS AND DISCUSSION

WestLand mapped, tagged, and recorded data on the seven ETA that were found during the initial survey effort. The field data sheets for these plants are provided in Appendix B. Subsequently two additional plants were located on the Parcel. The locations of the ETA found on the Parcel are depicted on Figure 3.

ETA are very thinly distributed across the Parcel. UTM coordinates (NAD 27) of ETA located during the survey are provided in Table 1. The accuracy of the UTM coordinates is approximately 6 meters (±20 feet). Appendix A provides photographs of Cacti 1 through 6 and Cacti 8 and 9. Cactus 7 was not photographed because it was inaccessible.

Table 1. Arizona hedgehog cacti on the Federal Parcel (NAD 27).

Cactus No.	UTM Coordinates Easting	UTM Coordinates Northing	Survey Method	General Location
1	[redacted]	[redacted]	Ground	[redacted]
2			Ground	
3			Ground	
4			Ground	
5			Ground	
6			Ground	
7*	--	--	Binocular	
8**			Ground	
9**		1	Ground	

*Cactus No. 7 was located by binocular survey and was physically inaccessible; therefore, no GPS coordinates or photograph were taken for this plant.
**Cacti 8 and 9 were found while conducting amphibian surveys on the Parcel.

4. CONCLUSIONS

An ETA survey was conducted on the Parcel by WestLand biologists from April 5 through 28, 2004. Nine ETA were found on the approximately 1,224-hectare (3,025-acre) Parcel. The ETA densities found on the Parcel (one plant per 136 hectares [336 acres]) are far less than those found in areas northeast of the Parcel at the Carlota Project in 1992 and 1993 (1 to 8 plants per hectare [2 to 20 plants per acre]).

The predominant rock type on the Parcel east of Apache Leap is Apache Leap tuff, one of the geologic formations typically associated with ETA habitat. This tuff formation covers approximately 90 percent of the Parcel. No obvious reasons for the extremely low densities of ETA on the Parcel are apparent. However, the Apache Leap tuff is comprised of several layers with various degrees of welding which are visually differentiated by rock color (i.e., brown [densely welded]; gray and vitrophyre [partly welded]; basal, top of white, upper white, lower white [unwelded]). Some of these layers may provide a more suitable substrate for ETA than others, but no direct association was observed.

5. REFERENCES

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APPENDIX A

ARIZONA HEDGEHOG CACTUS PHOTOGRAPHS

APPENDIX B
ARIZONA HEDGEHOG SURVEY DATA SHEETS

APPENDIX E

FIGURES