

BASELINE BIOLOGY AND LAND USE REPORT

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EXECUTIVE SUMMARY

The Resolution parcel (“the Parcel”) is located in Pinal County about three miles east of the Town of Superior in the vicinity of the No. 9 Shaft headframe, which was used to access Magma Copper’s underground workings. The parcel boundary is established along existing mining claim boundaries, staked as early as 1917. The parcel includes a 40-acre in-holding of private land.

The Parcel is bisected along the western side by the Apache Leap escarpment, which forms a large west-facing cliff. East of the Apache Leap, bouldery volcanic outcrops of the Apache Leap tuff formation dominate the landscape. Topography in this area slopes generally eastward toward Devils Canyon, with some areas sloping north toward Queen Creek. Topography west of the Leap is characterized by the differential erosion features of the various formations outcropping there.

Surface water within the Parcel is limited to stock water impoundments and snow melt and storm water flows in the ephemeral washes. Water also collects in boulder pools and tinajas in the drainage bottoms. The stock ponds contain water seasonally, with the exception of the Oak Flat Reservoir, which appears to contain water year-round. The ponds are home primarily to non-native tiger salamander, which apparently are stocked and seined each year and sold as bait. One small segment of Queen Creek, which appears to be intermittent in this reach, cuts across a corner on the north side of the Parcel.

A campground with 16 overnight spaces known as Oak Flat is located on the northeast side of the parcel, immediately adjacent to US Highway 60. The Parcel is also currently used for dispersed recreation. Common activities include camping, off-road driving, hunting, and hiking.

In addition, the parcel is used for rock climbing and bouldering, and an annual bouldering contest is held at Oak Flat each April.

Several cultural sites were identified during a Class III (full pedestrian) survey of the Parcel. A large site that includes a 1930s era Civilian Conservation Corps camp and more than 2,500 check dams is located in the Oak Flat area.

Vegetation within the Parcel is transitional between Sonoran desert scrub and interior chaparral, with the Apache Leap being roughly the demarcation between the two plant communities. In addition, several distinct landform-vegetation associations were identified within the Parcel. Vegetation within the Parcel showed evidence of stress related to recent drought conditions.

The cliffs of the Apache Leap escarpment, as well as the taller trees within the Queen Creek reach, provide suitable nesting habitat for birds of prey. An active peregrine falcon eyrie was identified in the cliffs on the west side of the Apache Leap. The peregrine is a designated as a Forest Sensitive species. Other raptors (Cooper’s hawk, Great-horned owl, Zoned-tailed hawk) were also observed on or near the Parcel. A variety of bat species may inhabit some of the historic mine adits on the Parcel. Several common species of birds, insects, reptiles, amphibians, and mammals were observed on the Parcel.

One federally listed endangered species, the Arizona hedgehog cactus, occurs on the Parcel. One individual plant was located during survey, though the majority of the Parcel is not occupied by this species. This species is more abundant in the area north of US Highway 60, adjacent to the Parcel.

1.0 INTRODUCTION AND PURPOSE

WestLand Resources, Inc. (WestLand) was retained by the Resolution Copper Company (Resolution) to prepare a Baseline Biology and Land Use Report describing a parcel of federal land ("the Parcel") in the Tonto National Forest immediately east of the town of Superior in Pinal County, Arizona. The Parcel is located approximately 97 kilometers (60 miles) east of Phoenix, Arizona on US Highway 60 (US 60) between the towns of Superior and Miami. Access is via a paved road at the Oak Flat Campground/Magma Mine Road exit from US 60. The Parcel is comprised of approximately 1,225 hectares (3,025 acres). The approximate location of the Parcel is shown in Figure 1, and the Parcel boundaries are shown in Figure 2.

Resolution intends to obtain the Parcel by way of a land exchange with the US Forest Service and to conduct studies to determine the feasibility of establishing an underground copper mine at the site. Activities associated with the feasibility studies may include, but may not be limited to, exploration drilling, geotechnical and seismic investigations, pilot shaft construction, mine dewatering, groundwater investigations, environmental studies, and associated road improvements. In the event that developing the Parcel as an underground copper mine is deemed feasible, additional construction and mining-related activities would occur on the

Parcel, including development of shafts and vents, and construction of ancillary support facilities. Processing (milling/concentrating) facilities and tailings deposition areas would not be located on the Parcel.

The purpose of this report is to describe the current biological environment and land use of the Parcel and immediately surrounding area in sufficient detail to provide the context for any future environmental analysis. Additional information regarding the current physical and human environment as well as historical detail is provided where this information is relevant to the biological and land use discussions. As such, this document is organized in the following fashion:

- Chapter 1 - Introduction (this section)
- Chapter 2 - Physical and Human Environment
- Chapter 3 - Vegetation Mapping and Habitat Analysis
- Chapter 4 - General Wildlife
- Chapter 5 - Special Status Species
- Chapter 6 - Summary
- Chapter 7 - Literature Cited

2.0 PHYSICAL AND HUMAN ENVIRONMENT

Selected site photos are included in Appendix A.

2.1. GEOGRAPHY AND TOPOGRAPHY

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 (Chronic 1983). The transition zone is composed of a series of smooth-floored basins separated by mountain ranges that extend from northwest to southeast Arizona. Other characteristics of the transition zone are:

- North/south striking, high-angle normal and reverse thrust faulting;
- Major late Cenozoic Era normal faulting;
- High tectonism (as compared to surrounding region);
- Monoclines (sloping strata) and uplift of the Laramide Orogeny (in the early Cenozoic Era) exposing Precambrian Era rock; and
- Monocline strata occurring at higher elevations than contiguous zones in the Colorado Plateau.

The Parcel lies largely atop one of the mountain ranges characteristic of the transition zone, with a steep escarpment on the western portion, dropping down towards one of the basins. Topography of the Parcel and surrounding area ranges from steep mountain slopes, with rock escarpments and deep canyons, to sloping flats. Elevation within the Parcel varies from approximately 915 to 1,525 meters (3,000 to 5,000 feet) above mean sea level (amsl).

The Apache Leap, a prominent west-facing cliff, dominates the western portion of the Parcel. Queen Creek, flowing generally from east to west, is the dominant drainage feature north of the Parcel. Several unnamed drainages onsite are tributary to Queen Creek. Devils Canyon, a north-south drainage immediately east of the Parcel, is fed by numerous tributaries from the east and west, including several unnamed, onsite streams feeding Rancho Rio Creek at the southern extent of the Parcel.

2.2. GEOLOGY

2.2.1. Geologic Formations

The major geologic formations that occur on the Parcel were mapped by Peterson (1969) in a US Geological Survey (USGS) study of the Superior quadrangle (Figure 3). A limited number of formations are exposed within the Parcel. 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. 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 following table presents the geologic formations exposed on the Parcel, based on Peterson (1969), in order from youngest (uppermost) to oldest (lowermost).

Table 2-1. Stratigraphic column at Parcel.

Era	Period (s)	Epoch(s)	Age (mil. yrs.)	Formation	Description
Cenozoic	Quaternary and Tertiary	Pleistocene and Pliocene	0.01 to 5	Gravel and conglomerate	Lacustrine sediments in small area of Oak Flat
Cenozoic	Tertiary	Miocene	20	Apache Leap Tuff	Dominant geologic unit overlying majority of Parcel. More accurately dated by Ferguson et al (1998) as 18.6 million years old.
Cenozoic	Tertiary	Miocene	20	Whitetail Conglomerate	Limited exposure along toe of Apache Leap escarpment near northwest corner of Parcel
Paleozoic	Permian and Pennsylvanian		240 to 330	Naco Group Shale and Limestone	Exposed along toe of Apache Leap escarpment
Paleozoic	Mississippian		330 to 365	Escabrosa Limestone	Limited exposure along toe of Apache Leap escarpment at southwest corner of Parcel
Paleozoic	Devonian		365 to 410	Martin Dolomite and Limestone	Limited exposure along toe of Apache Leap escarpment at southwest corner of Parcel
PreCambrian	Upper		570 to 1700	Troy Quartzite	Limited exposure along toe of Apache Leap escarpment at southwest corner of Parcel

The Apache Leap tuff is dacite (a volcanic rock with numerous quartz and feldspar phenocrysts) but, in terms of its chemical composition, is a quartz latite (Peterson 1961). Based on detailed mapping, Ferguson et. al (1998) determined that the tuff originated from the Superstition caldera (about 24 km [15 m]) northwest of the Parcel during a short-lived, rapid extensional tectonic phase that ended by 18.0 Million years ago (Ma). The age of the Apache Leap tuff itself has been determined to be 18.57 Ma by Ferguson et. al (1998). The deposit extends about 800 km² (309 mi²) to the southeast of the source caldera. In the vicinity of the Parcel, which lies within one of the thickest exposures of the ash deposit (about 400 meters [1,300 feet]), the formation tilts approximately 10° to 15° to the east (Peterson 1969 and 1979).

The Apache Leap tuff was first recognized as a nuée ardente (ash flow) by N.P. Anderson (1962). He recognized that the basal layer does not represent a lava flow or flows (which would have had a short, viscous, contorted flow structure) but is, like the rest of the Apache Leap tuff, un-contorted and flat to only moderately inclined. The tuff was likely to have been deposited by several, separate incandescent clouds in rapid succession (Peterson 1968), but the individual deposits are not distinguishable from one another. According to Anderson (1962), as a whole, the remnant ash flow deposit consists of a thin layer of non-welded light-gray tuff at the base with an abrupt transition to densely welded black vitrophyre that is in turn overlain by a thick dense layer of welded tuff followed by a yet thicker layer of less welded to poorly welded material. Thus, with the exception of the thin unwelded basal layer, the degree of welding increases with depth of the formation.

The zones of welding and the zones of crystallization are consistent in vertical section across the Apache Leap tuff, which indicates that the ash flow cooled as a single unit (Peterson 1968) and supports the theory of rapid succession of the individual deposits. Peterson (1968) provided further refinement of the layering identified by Anderson (1962) above, listing outer upper and lower zones of no welding, internal upper and lower zones of partial welding, and a central zone of dense welding. Again, this characterization further suggests that the ash flow cooled as a single unit, with outer surfaces (whether exposed to the earth on the bottom or the atmosphere at top) cooling first and the core cooling last. This trend, combined with weight loading, resulted in greater welding toward the core (and near the bottom) of the ash flow.

The surface exposures of the Apache Leap tuff within the Parcel and immediately adjacent land were mapped recently by J. L. Gant (2002, unpublished Kennecott map; Figure 4). Gant's work is a refinement of Peterson (1968). Gant identifies the uppermost exposed tuff as a white unit, with subdivisions into upper and lower components, and an underlying gray component. The top surface of the upper white tuff is exposed in the Oak Flat campground basin area in the northeast quadrant of the Parcel, while the eroded surface of the upper white tuff extends in a broad band across the center of the Parcel from the northwest to the southeast (with additional, offsite exposure extending in an arc to the south and east of the Parcel). The lower white tuff component is exposed in a narrow band adjacent to the western extent of the eroded upper white tuff, with irregular exposures south and east of the Parcel, particularly along the eroded cliffs of Devils Canyon. The underlying, eroded gray tuff is exposed farther to the southwest adjacent to the lower white tuff, and is also exposed to a limited extent in Devils Canyon east of the Parcel. The configuration of these successively deeper components in an arc around the Parcel

reinforces the theory of an original basin structure with subsequent erosion removing material from the perimeter and protecting the original tuff surface at the center of the basin.

As previously noted, the degree of welding increases through the formation with components closer to the original core more welded than other components. Accordingly, the gray tuff exposed on the southwestern portion of the Parcel is more welded than the white tuff exposed in the northeastern portion. Furthermore, the more welded components (i.e., gray tuff) were observed by WestLand to display a higher degree of horizontal fracturing than the less welded components (i.e., upper white tuff). The degree of welding of the Apache Leap tuff, and the resultant differing weathering properties, appears to have an effect on the vegetation composition and distribution within the Parcel, as described in Chapter 3.

The Naco Group makes up the second largest formation in aerial extent within the Parcel and is exposed on the Parcel exclusively along the toe of the Apache Leap. The intercalated shale and thinly bedded limestone sections present in the Naco Group are similar to and likely to be correlated with the Pennsylvanian Period Horquilla Formation that is widely exposed in southeastern and south-central Arizona (Keith 1983; Blakey and Knepp 1989). The Pennsylvanian Horquilla and Earp Formations were deposited within a continental Paleozoic marine sea (the Pedregosa basin) that extended from southern Arizona and southwestern New Mexico north to the Mogollon Rim (Ross 1973) and west to the Vekol Mountains (Dockter and Keith 1978). Although the Naco Group includes Permian strata, these are not present in the Superior area; Permian-age Naco strata are not found north of the Pima-Pinal County line (Bryant and McClymonds 1961). The entire Paleozoic section as mapped by Peterson (1969), and including one additional lower formation not found on the Parcel (Cambrian Bolsa quartzite), has a combined vertical extent

of greater than 800 m (2,600 ft) of section and an easterly dip of 35° to 40° (Hammer and Peterson 1968).

Three faults were recognized and mapped by Peterson (1968, 1969) in the Parcel within the Apache Leap tuff, and are referred to as Anxiety Fault, Peterson #1 Fault, and Peterson #2 Fault by Gant (2002). Gant mapped several other faults within the Apache Leap tuff, including Photo #1 Fault and Photo #2 Fault. In addition, the Proterozoic and Paleozoic bedrock west of Apache Leap (i.e., off site) has a large number of block faults that were mapped by Peterson (1969). Dating or offset information regarding these faults was not available; however, the USGS National Seismic Hazard Mapping Project identifies the area as having a predicted peak ground acceleration of about 18 percent gravity, with a 2 percent probability of exceedance in 50 years (USGS 2003).

2.2.2. Geomorphology

As described above, the Apache Leap escarpment dominates the visible structure of the western portion of the Parcel. The Apache Leap tuff forms the escarpment cap and uppermost cliff face, with older (underlying) units displaying a range of cliff-forming or slope-forming characteristics. The exposed bedrock underlying the tuff (west of the escarpment cap) and extending off site includes diabase, basalt, quartzite, and limestone. Quartzite and the denser limestone are more resistant to weathering than diabase and basalt and, consequently, are cliff-forming on the west face of the Apache Leap escarpment. Underlying the Apache Leap tuff, the thick-bedded limestone of the Escabrosa Formation form the most prominent cliffs in this sequence, while the Naco Formation contains interbedded hard limestone and soft shale and is less cliff-forming. Along the higher ridges, the differences in weathering of the limestone and shale beds of the strongly dipping (35° to 40°) Naco bedrock produce a scalloped appearance (Photo 2-1).

Photo 2-1



The offsite diabase and basalt weather more rapidly than the onsite quartzite and limestone, resulting in the diabase being a slope-forming bedrock off site at the toe of the Apache Leap escarpment. The slopes of diabase are generally covered with colluvium eroded from the higher exposed formations. The diabase is most easily discerned by the distinctive colors (dark brown, green and gray) of this unit exposed in road cuts that cross the diabase.

The geomorphology east of the Apache Leap escarpment is notable primarily for the relative lack of soils generated from weathered Apache Leap tuff. As noted above, the surface of the Apache Leap tuff above the cliff is relatively flat, tilting slightly to the east. The gravel and conglomerate deposit in the eastern portion of the Parcel likely represents a local depression within the surface of the Apache Leap tuff, where eroded material accumulated in a shallow lake and coalesced into this weakly consolidated formation; this material is therefore characterized as lacustrine. This area of the Parcel is part of what is now known as Oak Flat. Alluvial deposits in this area of the Parcel have also been mapped by Gant (2002) and, as noted below, are concentrated in watercourses. The mapping of the highly welded gray unit of Apache Leap tuff and the less welded white unit (by Peterson [1968] and Gant [2002]) is reflective of the tendency of the tuff units to form cliffs. The hoodoos, cliffs, and other prominent

geomorphic features along Devils Canyon and Apache Leap are dependent on the gray unit's relatively greater resistance to weathering.

2.2.3. Soils

The soils associated with the Apache Leap tuff are classified as Lithic Torriorthents (Hendricks 1985), and were formed as a residuum weathered from the tuff. These soils are shallow, gravelly, and strongly sloping to very steep soils, and, consequently, are well drained. Because the upper Apache Leap tuff was apparently deposited as a vapor phase zone, crystals of the upper tuff are primarily feldspar and quartz. Feldspar and quartz are not clay forming. In contrast, the lower vitrophyre layer of the Apache Leap tuff contains significant amounts of glass, which weathers rapidly to form clay. However, this lower layer is not as exposed as (and consequently less layered than) the upper layer, resulting in less clay formation than would otherwise occur.

The multitude of fractures occurring throughout the Apache Leap tuff provides a series of small catchments for gravelly soils. With modest clay accumulations and an accumulated volume of weathered tuff, fractures represent one of the few significant areas for the accumulation of soils within the Parcel. Gant (2002) found limited alluvial soil deposits on site within Oak Flat and along selected reaches of Queen Creek and its tributaries.

2.3. CLIMATE

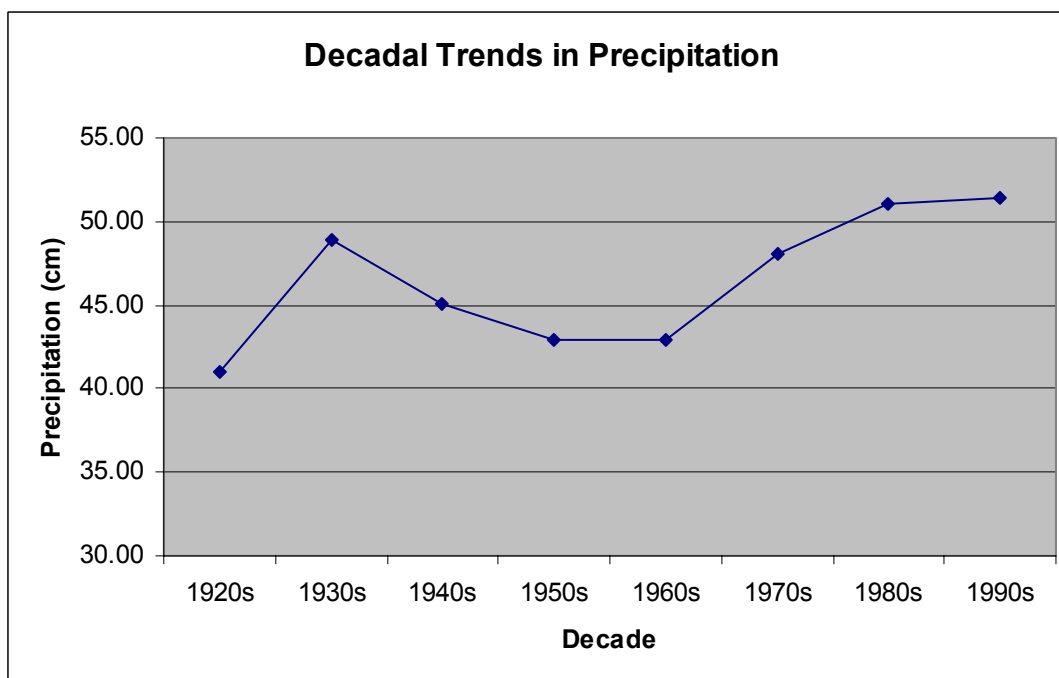
The climate within the region is characterized as semi-arid. Precipitation patterns change significantly with the seasons. Winter precipitation comes generally from the Pacific Ocean in frontal-type storms and on average represents approximately 32 percent of the annual precipitation. Spring is the driest season,

with incidental storms bringing in about 8 percent of the annual precipitation on average. Summer precipitation is generally produced by local convective storms with moisture from the Gulf of Mexico and represents about 34 percent of the annual precipitation. Fall storms occur in both the convective storm and frontal storm modes, as autumn is a transitional season between summer and winter. This unique bi-modal pattern represents, on average, about 26 percent of the annual precipitation.

Since 1920, monthly rainfall data have been continuously collected at the BHP Copper – Superior Operations mining facility immediately west of the Parcel. The data reflect general trends in rainfall over the last 80 years, highlighting periods of relative wetness and drought. Average annual rainfall over this period is approximately 46.46 cm (18.29 in), with a range from 24.43 cm (9.62 in) in 1989 (with one other exceptionally low precipitation year) to a high of 90.86 cm (35.77 in) in 1978. The exceptional year was 2002 (the last year of complete data), which recorded only 9.93 cm (3.91 in) of precipitation. Further analysis of 10-year trends, by 20th century decades, reveals significant variability as shown in the following table and chart.

Table 2-2. Precipitation trends, 10-yr increments.

Decade	Annual Average Precipitation (cm)
1920s	41.05
1930s	48.87
1940s	45.09
1950s	42.88
1960s	42.98
1970s	48.11
1980s	51.08
1990s	51.44



These data suggest a 40- to 50-year cycle during the 80-year period of record, with a recent trend of increasing annual average precipitation: the 1980s and 1990s are the wettest decades on record. Statistical analysis reveals that, generally, annual precipitation during the 1920s, 1940s, 1950s, and 1960s fell within one standard deviation (14.53 cm; 5.72 in) from average, while greater variability occurred during the 1930s, 1970s, 1980s, and 1990s. For example, as mentioned above, 1989 was one of the driest years on record, at 24.43 cm (9.62 in), while the second wettest year on record was 1992, at 90.63 cm (35.68 in). The lower value is 1.5 standard deviations from the norm, while the higher value is 3.0 standard deviations, occurring within a 3-year span.

Furthermore, the data indicate a recent drought period, with an average annual rainfall of 30.30 cm (11.93 in) from 1996 through 2002, approximately 35 percent below the 80-year average. An analysis of the 5-year rolling average precipitation indicates a peak value of 69.06 cm (27.19 in) in 1992, while the recent drought period has resulted in a historic low 5-year rolling average of 17.96 cm (7.07 in) in

2002. As noted above, 2002 recorded the lowest precipitation during the period of record, at 9.93 cm (3.91 in) of precipitation. Thus, the 40- to 50-year precipitation cycle noted above may have peaked in the early 1990s after some 20 years of above average (on a rolling average basis) precipitation, and a drought era entered thereafter. It is, of course, not possible to accurately predict future rainfall trends and verify the theorized 40- to 50-year cycle.

Effects of the recent drought on vegetative resources within the Parcel are described in Chapter 3, below.

Temperature data for the Parcel and near vicinity were obtained from the Western Regional Climate Center's Internet Web Site (www.wrcc.dri.edu). For the period of record (July 1920 through July 2003) at the Superior weather station (i.e., immediately west of the Parcel and at a lower elevation within the basin), the annual average maximum temperature was 26.2° C (79.2° F) while the annual average minimum temperature was 14.8° C (58.6° F). The month with the highest average maximum temperature is July, at 36.4° C (97.6° F), and the

month with the lowest average minimum temperature is January, at 6.2° C (43.1° F). From June through September, the average daily temperature is 26.7° C (80° F). Temperatures above 37.8° C (100° F) occur often during this period, but are usually accompanied by very low relative humidity. The data indicates weather in this area is typical of a semi-arid climate with a warm average temperature. Winters are mild with temperatures rarely falling below freezing at night.

It should be noted that Golder Associates Inc. has installed three air/meteorology stations in the Parcel area to collect site-specific air quality and meteorological data. This information will be reported by Golder under separate cover.

2.4. LAND USES

2.4.1. Land Ownership

Land within the Parcel boundary is principally federal land managed by the U.S. Forest Service (USFS) as the Tonto National Forest (Figure 5). A 40-acre in-holding property is owned by BHP Copper, Inc. Surrounding land includes additional USFS Tonto National Forest lands (with patented and unpatented claims by BHP Copper Inc. and ASARCO), state lands, and privately held land within the town of Superior.

2.4.2. Mining

A number of historic mine workings have been identified within and adjacent to the Parcel, particularly on the west side of Apache Leap. The majority of these workings date from the late 1800s and first half of the 1900s. Significant mining occurred at the Silver King Mine, west of the Parcel, and the Silver Queen Mine (later, Magma Mine), an underground mine with one shaft and related workings partially beneath, and with surface facilities immediately north of, the Parcel. Although originally a silver and gold mine, the Silver Queen Mine was recognized for

its copper value in the early 1900s and various holdings were consolidated by William Boyce Thompson as Magma Copper Company in 1910 (Cowan 2000). A concentrator-smelter facility was located at Superior. In addition to the mineral resources, the Magma Mine is famous for the development and installation of the first refrigeration units, in 1937, to address rock temperatures of 60° C (140° F) measured in the shaft at 4,000 feet below ground surface. The Magma Mine was purchased by BHP Copper, Inc. in the mid 1990s. The mine is currently inactive.

Several active mines, including copper mines and quarries for limestone and other minerals, operate within the surrounding region. Perlite and limestone quarries are present west and north of Superior. The Globe mining district, one of the most significant copper mining areas in Arizona, is centered about 19 km (12 miles) east of the Parcel (the closest extent of the Globe district is Pinto Valley, about 11 km (7 miles) northeast of the Parcel).

2.4.3. Recreation

The Parcel is located within the 182,000-hectare (450,000-acre) Globe Ranger District (District 2) of the Tonto National Forest, and as such is managed by the USFS. In order to inventory and classify National Forest Service lands for planning and managing a range of recreational experiences and settings, the USFS commonly uses the Recreation Opportunity Spectrum (ROS). For management and conceptual convenience, possible combinations of activities, settings, and probable experience opportunities have been arranged along a spectrum, or continuum (the ROS), which is divided into six classes: Primitive, Semi-Primitive Non-Motorized, Semi-Primitive Motorized, Roaded Natural, Rural, and Urban. Table 2-3 provides the setting characterization for the ROS classes. Other criteria for defining these classes (not described here) include: size of area, remoteness, evidence of humans, recreational

experience, social setting, and managerial setting.

Table 2-3. ROS Classes

Class	Setting Characterization (for descriptive purposes only)
Primitive (P)	Area is characterized by essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use within the area is not permitted.
Semi-Primitive Non-Motorized (SPNM)	Area is characterized by a predominantly natural or natural-appearing environment of moderate-to-large size. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but are subtle. Motorized use is not permitted.
Semi-Primitive Motorized (SPM)	Area is characterized by a predominantly natural or natural-appearing environment of moderate-to-large size. Concentration of users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present, but are subtle. Motorized use is permitted.
Roaded Natural (RN)	Area is characterized by predominantly natural-appearing environments with moderate evidences of the sights and sounds of man. Such evidences usually harmonize with the natural environment. Interaction between users may be low to moderate, but with evidence of other users prevalent. Resource modification and utilization practices are evident, but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities.
Rural (R)	Area is characterized by substantially modified natural environment. Resource modification and utilization practices are to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Moderate densities are provided far away from developed sites. Facilities for intensified motorized use and parking are available.
Urban (U)	Area is characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Renewable resource modification and utilization practices are to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans, on-site, are predominant. Large numbers of users can be expected, both on-site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site.

These six classes (or positions along the continuum) and the accompanying class names have been selected and conventionalized by the USFS because of their descriptiveness and utility in land and resource management planning and other management applications.

The ROS is based on three primary criteria: physical, social, and managerial. Each of these criteria has a range of settings, i.e. Physical (Pristine ⇔ Developed), Social (Crowded ⇔ Solitude), and Managerial (Regulated ⇔ Unregulated). A recreational opportunity setting

is the combination of physical, social and managerial conditions that give a specific value to a place. The ROS provides a framework for defining the types of outdoor recreation opportunities the public might desire, and identifies that portion of the spectrum that a given National Forest might be able to provide.

As a public land, the Tonto National Forest (including the Parcel) provides a variety of recreational opportunities, including biking, bird watching, camping, hiking, historical and archaeological interests, hunting, off road motor sports, mountaineering, prospecting, canyoneering, and rock climbing.

The Oak Flat Campground, located on the northeastern portion of the Parcel, offers year-round, barrier-free rustic camping. Included at the campground are 16 campsites (14 tent or recreational vehicle sites and two tent only sites), which are available at no charge for a maximum stay of 14 days. There are no drinking water or picnic facilities at the campground.

Rock climbing, in particular, is a popular recreational activity within the Parcel. Numerous rock climbing sites on the Parcel have been specifically identified by these users (Figure 6). In addition, the Apache Leap area, Devils Canyon, and several areas along US 60 are popular rock climbing areas within the vicinity of the Parcel. Given the favorable rock climbing conditions, a number of climbers are attracted to the Parcel and vicinity each year for organized and unorganized climbing events. In particular, Oak Flat Campground is the site of the annual Phoenix Bouldering Contest (PBC), the largest organized climbing event in the U.S., which attracts hundreds of climbers from around the world to compete for prizes (Photos 2-2 and 2-3). The 20th Annual PBC was held from April 25 through 27, 2003. WestLand personnel attended the event to identify areas used during the competition.

Photo 2-2



Photo 2-3



A majority of the competition occurs west of the Oak Flat Campground in a deep gorge area. In addition to the climbing activities, 49 vendor booths and an entertainment stage were set up in the campground area.

Based on the known recreational uses of the Parcel, WestLand conducted an analysis utilizing the ROS approach. The northern portion of the parcel near Oak Flat campground could best be described as "Roaded Natural" due to the evident human usage and the likelihood of encountering other users. In addition, the typical uses in this area are motorized. Further south, the Parcel is characterized by rugged, natural features relatively undisturbed by humans, but still accessible by motorized vehicle. This area is described as "Semi-primitive Motorized." A small portion of the Parcel, west of the interior access road to the Apache Leap escarpment,

provides no roads for motorized vehicles and is considered "Semi-Primitive Non-Motorized".

2.4.4. Grazing

Due to the nutrient rich vegetation and year-round grazing opportunities, ranching is a common land use within much of the Tonto National Forest. However, drought-like conditions in southern Arizona within the last 5 to 7 years (see Section 2.3 Climate, above) have reportedly required the Globe Ranger District to more tightly manage grazing on forest allotments and drastically reduce stocking rates in order to achieve long-term sustainability of the grazing resource.

A grazing lease on a portion of the Parcel is held by ASARCO (Dan Mead, pers. comm.), and is known as the Devils Canyon allotment. Per USFS policy, subleasing the allotment is prohibited. The lease is scheduled to expire on December 9, 2004. The allotment allows for a maximum of 303 adult animal units and 54 yearlings.

Current and historic evidence of grazing is evident throughout the Parcel east of Apache Leap and on surrounding lands to the south and

east. Several stock tanks are present in drainages within the Parcel and on surrounding lands. Additional ranching features include cattle guards on access roads, barbed-wire fencing, and holding pens. Horses and cattle were observed on several occasions on or near the Parcel.

No evidence of current or historical ranching was observed on the Parcel west of the Apache Leap, presumably due to the relatively rugged terrain and lack of a sufficient water supply.

2.5. HUMAN ENVIRONMENT

2.5.1. Cultural Resources

A cultural resources survey of the Parcel has been completed and the results compiled into a report (Lindeman and Whitney, 2003). The survey included approximately 3,400 acres and identified 13 archaeological sites (one of which includes four separately identified sites), as summarized in the following table.

Table 2-4. Archaeological sites within the Parcel.

Site No.	Loci	Age	Description
AZ U:12:26/125	25	Archaic to Historic	Large (3,673,000 m ² or 908 acre) site originally assigned to described Historic Period Civilian Conservation Corps (CCC) camp and construction sites. Expanded to include prehistoric and other historic features. Prehistoric features include Classic Hohokam and Protohistoric Yavapai/Apache masonry structures and artifact scatters. Historic features include 2,560 CCC check dams, campsites, corrals, and artifact scatters. 56 additional features not associated with the 25 loci, and 42 small artifact scatters not associated with loci were also identified.
AZ U:12:26/171		Prehistoric	Masonry structures with sherd, lithic, and ground stone scatter; contained within AZ U:12:26/125
AZ U:12:26/846		Prehistoric	Sherd, lithic, and ground stone scatter; contained within AZ U:12:26/125
AZ U:12:26/847		Prehistoric	Masonry structure with sherd, lithic, and ground stone scatter; contained within AZ U:12:26/125

Table 2-4. Archaeological sites within the Parcel.

Site No.	Loci	Age	Description
AZ U:12:26/1520		Prehistoric	Sherd, lithic, and ground stone scatter; contained within AZ U:12:26/125
AZ U:12:143/1259		Prehistoric	Rock alignment and tinajas with sherd, lithic, and ground stone scatter
AZ U:12:164/1512		Historic	Telephone line between Superior and Miami
AZ U:12:165/1513		Protohistoric	Sherd and flaked stone scatter
AZ U:12:166/1514		Historic	Homestead with livestock enclosures and trash scatter
AZ U:12:167/1515		Protohistoric	Rock rings/cleared areas, rock alignments, grinding features, and ceramic and flaked stone scatter
AZ U:12:168/1516		Protohistoric	Masonry structure and artifact scatter
AZ U:12:169/1517		Protohistoric	Rock alignment, oval rock ring/cleared area, boulder grinding, and light artifact scatter
AZ U:12:170/1518		Protohistoric	Rock rings/cleared areas and artifacts
AZ U:12:171/1519		Prehistoric	Ceramic and lithic scatter and rock ring/cleared area
AZ U:12:172/1523		Historic	Pack trail
AZ V:2:101/1077		Historic	Portion of original US 60 alignment
AZ V:5:198/1403		Historic	Portion of Eastern Mining Area 115kV Transmission Line

2.5.2. Socioeconomic Resources

According to the 2000 US Census Bureau, the population of the Town of Superior was 3,254 within the approximately 2 square-mile incorporated area. The average resident's age was 39, and the age range distribution was (E-podunk 2003a):

- 15 or younger- 22.2 percent
- 16-24- 12.7 percent
- 25-44- 21.7 percent
- 45-64- 23.4 percent
- 65 and older- 19.9 percent

The race and ethnicity data is broken down as follows (E-podunk 2003a):

- White – 72.7 percent
- Black or African American – 0.5 percent
- American Indian and Alaska native – 1.6 percent

- Asian – 0.3 percent
- Native Hawaiian and other Pacific islander - 0.1 percent
- Some other race – 23.0 percent
- Two or more races – 1.8 percent
- Hispanic or Latino – 69.1 percent (this group is likely represented as a subset of the white population.)

Median household income in Superior, in 1999, was \$27,069 (E-podunk 2003b). Percentage of people within Pinal County below the poverty line, in 1999, was 16.9% (13.9% for the state in the same period) (U.S. Census Bureau webpage:

<http://quickfacts.census.gov/qfd/states/04/04021.html>).

3.0 VEGETATION MAPPING AND HABITAT ANALYSIS

3.1 METHODS AND MAPPING CONVENTIONS

Mapping of the Parcel focused on broad vegetation-landform associations, with particular interest paid to those associations that appeared to be determined by rock type, soil volume, and/or hydrologic conditions. Some plants, like oaks, agaves, and saguaros, bear significance as food resources or nesting/roosting sites for wildlife, and consideration was given to the distribution and apparent standing biomass of these plant species.

Four sources of information were utilized while mapping vegetation on the Parcel: (1) Peterson's (1969) geologic map of the Superior Quadrangle (Figure 3), (2) Jon Gant's March 2002 unpublished fine-scale mapping of the Apache Leap tuff in the Oak Flat area (Figure 4), (3) the 2000 Ikonos infra-red aerial photographs of the Resolution and Devils Canyon area, and (4) a 2002 color aerial photograph of the Parcel.

Because the Parcel is largely bedrock controlled, Peterson's geologic map was utilized to identify the exposed strata of the several Paleozoic formations on the western portion of the Parcel. When slope and aspect were similar, the vegetation on each of the Paleozoic formations was compared qualitatively with vegetation on adjacent formations in order to identify the relative amount of plant biomass each supported, as well as to identify whether some species had restricted or abundant occurrences on particular formations.

Visual surveys were conducted during several field episodes by walking non-linear transects of varying lengths (up to four km), including canyon bottoms, slopes, and ridges. Vegetation at significant distance from the pedestrian transects was examined with binoculars and spotting scopes. Detailed observations were

recorded, and mapping of vegetation was performed. Where required, plants were identified using Kearney and Peebles (1960), Benson (1969), Epple (1995), selected volumes of *The Flora of North America* (Morin 1993), and by comparison with herbarium specimens at the University of Arizona.

3.2. RESULTS AND DISCUSSION

3.2.1. Biotic Communities

In the most general terms, the Parcel and near vicinity are 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. A more detailed discussion of the vegetation communities within the Parcel is provided below.

3.2.1.1. East of Apache Leap

As described above, the area east of Apache Leap is generally classified as Interior Chaparral (Brown 1994). Within the Parcel, the land slopes in an easterly direction towards Devils Canyon, with an imbedded plateau area associated with Oak Flat Campground. Typical of Interior Chaparral, vegetation east of the Leap is dominated by scrub live oak (*Quercus turbinella*) and pointleaf manzanita (*Arctostaphylos pungens*). Plant species observed during field reconnaissance are listed in Table 3-1.

Table 3-1. Plant species observed east of Apache Leap.

Common Name	Scientific Name	Common Name	Scientific Name
Catclaw	<i>Acacia greggii</i>	Barrel cactus	<i>Ferocactus wislizenii</i>
Agave	<i>Agave chrysantha</i>	Ocotillo	<i>Fouquieria splendens</i>
Desert honeysuckle	<i>Anisacanthus thurberi</i>	Broom snakeweed	<i>Gutierrezia sarothrae</i>
Pointleaf manzanita	<i>Arctostaphylos pungens</i>	Burroweed	<i>Isocoma tenuisecta</i>
Desert broom	<i>Baccharis sarothroides</i>	One-seed juniper	<i>Juniperus monosperma</i>
Red barberry	<i>Berberis haematocarpa</i>	Wait-a-minute bush	<i>Mimosa biuncifera</i>
Fairy duster	<i>Calliandra eriophylla</i>	Prickly pear	<i>Opuntia engelmannii</i>
Crucifixion thorn	<i>Canotia holacantha</i>	Cholla	<i>Opuntia sp.</i>
Saguaro	<i>Carnegiea gigantea</i>	Velvet mesquite	<i>Prosopis velutina</i>
Desert hackberry	<i>Celtis pallida</i>	Emory oak	<i>Quercus emoryi</i>
Palo verde	<i>Cercidium sp.</i>	Scrub live oak	<i>Quercus turbinella</i>
Mountain mahogany	<i>Cercocarpus montanus</i>	Arizona white oak	<i>Quercus arizonica</i>
Sotol	<i>Dasyllirion wheeleri</i>	Arizona cottontop	<i>Trichachne californica</i>
Hopbush	<i>Dodonaea viscosa</i>	Arizona rosewood	<i>Vauquelinia californica</i>
Mormon tea	<i>Ephedra sp.</i>	Graythorn	<i>Ziziphus obtusifolia</i>
Turpentine brush	<i>Ericameria laricifolia</i>		

Interior Chaparral is typified by 60 to 70 percent vegetative cover (predominately shrubs and small trees) (Brown 1994), though coarse estimates from field observations east of the Leap indicated shrub cover averaging 25 to 50%. Cover was notably higher in xero- and mesoriparian areas within the Parcel. Also characteristic of this biotic community is a relatively low density of herbaceous cover due to the relatively higher shrub cover, typically thin to absent soil, and relatively low annual precipitation.

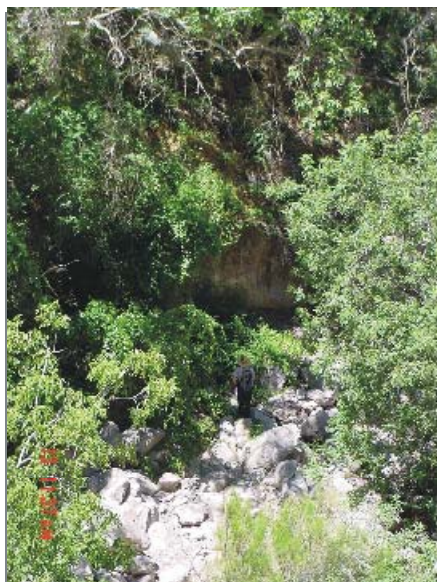
Vegetation in the Oak Flat Campground area has been impacted by recreation, camping, off-highway vehicle use, and cattle grazing.

Damage is most evident along washes and trails that cross the site. Non-native one-seed junipers (*Juniperus monosperma*) have been planted to form a windbreak along the western portion of the camping area, and a stand of scrub live oak and Emory oak southeast of the campground has obviously been used for recreation and wood scavenging for campfires. A description of specific plant-landform associations found east of the Apache Leap is provided in the sections below.

3.2.1.1.1. Riparian Corridor along Queen Creek

A short reach, approximately 450 m (1,476 ft) in length, of Queen Creek occur within the Resolution Parcel (Photo 3-1).

Photo 3-1



Woody species observed within this lower reach include: Arizona walnut (*Juglans major*), Arizona sycamore (*Platanus wrightii*), western cottonwood (*Populus fremontii*), Emory oak (*Q. emoryi*), Arizona white oak (*Q. arizonica*), and netleaf hackberry (*Celtis reticulata*). In addition, individuals of serviceberry (*Amelanchier* sp.) and maple (*Acer* sp.), two woody plants indicative of cooler wetter areas, occur within a few hundred meters downstream along Queen Creek.

This reach of Queen Creek has been observed with non-flood flow during part of the winter season. The reach includes both areas of scoured bedrock and areas of alluvium. The channel is shaded part of each day because it is on the north side of 50 m (150+ ft) cliffs.

3.2.1.1.2. Other Alluvial Associations

The presence of alluvium within the Parcel's channels is generally discontinuous, occurring in discrete patches of varying size (Photo 3-2). [Note that the unnamed ephemeral drainages within the Parcel have been designated with letters for the purposes of this report (Figure 7)]. Observations in the field indicate that three tree species within the Resolution Parcel (Emory oak, netleaf hackberry, and Arizona white oak [*Quercus arizonica*]) are dependent on the

presence of channel alluvium, with tree size (height and/or mass) appearing to be proportional to the volume of available alluvium.

Photo 3-2



Gooddings willows (*Salix gooddingii*) and western cottonwoods were observed at or within the immediate vicinity of each of the reservoirs on the Parcel. The seedlings of both of these species require full sun and sandy, moist soils in order to successfully establish. While these species occur within the Parcel, observed individuals appear to have been effected by recent drought conditions, with some mortality observed and other plants showing significant die-back.

Channels D, J & M (Figure 7) within the Parcel support a generally mesoriparian habitat, with observed species including a predominance of Emory oaks as well as Gooddings willow, tamarisk (*Tamarix ramosissima*), New Mexico locust (*Robinia neomexicana*), wild cherry (*Prunus* cf. *virens*), chaparral honeysuckle (*Lonicera interrupta*), Wright silktassel (*Garrya wrightii*), three-leaf sumac (*Rhus trilobata*), redberry (*Rhamnus crocea*), as well as pointleaf manzanita and scrub live oak. These channels were the only acres within the Parcel observed to support locust and cherry trees.

3.2.1.1.3. Vegetation along the Peterson and Photo Faults

In general, the vegetation on the hillsides on the Lower White tuff and Gray tuff in the area west and southwest of Anxiety Fault were observed to have a xeric aspect. Succulents such as golden flowered agave (*Agave chrysantha*), sotol (*Dasylirion wheeleri*), and cane cholla (*Opuntia imbricata*) are relatively common on the slopes. Pointleaf manzanita is likewise common on these slopes, though dieback on this species was observed as high as 50 to 75%, presumably due to recent drought conditions in the Parcel.

Against this backdrop of rather sparse, xeric vegetation, the denser, taller vegetation observed along the faults stands in sharp contrast. Where faults crossed canyon channels, relatively dense and robust stands of scrub live oak were observed, with additional associates such as redberry, chaparral honeysuckle, and Wright silktassel. Where those canyon channels are more steeply inclined, mountain mahogany (*Cercocarpus montanus*) predominates. Mountain mahogany appears to dominate where faults and associated fractures are exposed on slopes (Photo 3-3).

Photo 3-3

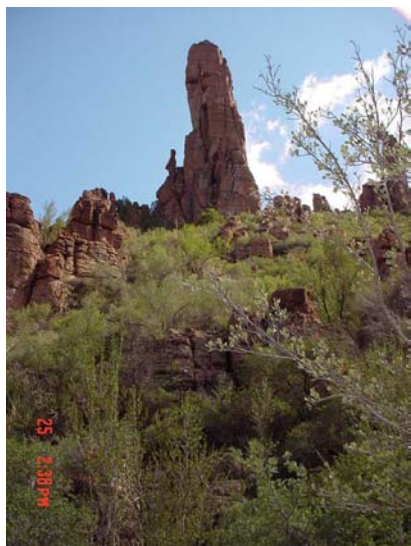


3.2.1.1.4. Emory Oak and Mountain Mahogany Distribution Across Apache Leap Tuff Zones

As described above, most of the vegetation on the Apache Leap tuff within the Parcel can be classified within Brown's (1994) Interior Chaparral. The most ubiquitous chaparral species in the Parcel are scrub live oak and pointleaf manzanita, which can be seen growing on almost all levels of the Apache Leap tuff. Nearly any slope or aspect on the Resolution Parcel will support at least a few of these two species.

Two other species occurring on the Apache Leap tuff, Emory oak and mountain mahogany, appear to be spatially segregated into two broad areas. Throughout the Parcel, either one or the other species occurs, but not both (except at the area of interface), with Emory oak generally occurring on the eastern half of the parcel and mountain mahogany on the western half (Figure 8; Photo 3-4). The coarsely approximated contact zone between these two species (indicated by the dashed line in Figure 8) is *approximately* the demarcation between the Upper White tuff and the Lower White tuff, as mapped by J. Gant (2002) (Figure 4). (Note that islands of both species occur for a few hundred meters on either side of this boundary, and the southern portion of the boundary extends about 500 m (1,600 feet) eastward into the area mapped as Upper White tuff.)

Photo 3-4



This pattern of Emory oak on Upper White tuff and mountain mahogany on the lower zones of Apache Leap tuff is supported by observations that this spatial segregation (and species boundary) exists (A) between Oak Flat and Devils Canyon (to the east of the Parcel); (B) between Oak Flat and Rancho Rio Canyon (to the south); (C) between No 9 Shaft and Queen Creek (to the northwest); and (D) at about 500 m (1600 ft) north of US 60 in upper Queen Creek Canyon. In each case the boundary is close to Gant's delineation between Upper White tuff and Lower White tuff.

The segregation of these two species does not appear to be an artifact of elevation, slope, or aspect. To the southwest and north of Oak Flat (which supports Emory oak), mountain mahogany occurs higher than the Emory oak on Oak Flat. To the northwest and east, mountain mahogany occurs lower than the Emory oak on Oak Flat. In addition, the complex topography within areas occupied by both Emory oak and mountain mahogany includes both of these plants on essentially all slopes and aspects, though both are generally more abundant and include larger plants on north facing slopes.

The spatial segregation of these two species may be due to the apparently different root

architectures and soil volume requirements of these two species, coupled with the varying substrates provided by the tuff zones. A similar spatial distribution pattern related to the tuff zones was observed in a species of lichen (*Xanthoparmelia*), which was observed commonly on the Gray tuff, but appeared essentially absent from the Upper White tuff.

3.2.1.2. West of Apache Leap

Vegetation occurring west of Apache Leap is classified as Arizona Upland Subdivision of the Sonoran Desertscrub biotic community (Brown 1994). Typically a wetter biotic community than other desert lands (averaging 300 to 450 mm [12 to 18 in] annual rainfall), the Arizona Upland 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). Within the Parcel, the Jojoba-Mixed Scrub series dominates the area west of the leap (Photo 3-5). Found at the upper limits of Arizona Upland, and the transition zones between Sonoran Desertscrub and Interior Chaparral, this series has a characteristic "chaparral-like" physiognomy, which distinguishes it from other desertscrub series.

Plant species observed during field reconnaissance west of Apache Leap are listed in Table 3-2.

Photo 3-5



Table 3-2. Plant species observed west of Apache Leap.

Common Name	Common Name	Common Name	Common Name
Catclaw	<i>Acacia greggii</i>	One-seed juniper	<i>Juniperus monosperma</i>
Agave	<i>Agave chrysantha</i>	Wait-a-minute bush	<i>Mimosa biuncifera</i>
Yucca	<i>Yucca sp.</i>	Deergrass	<i>Muhlenbergia ringens</i>
Pointleaf manzanita	<i>Arctostaphylos pungens</i>	Beargrass	<i>Nolina microcarpa</i>
Desert broom	<i>Baccharis sarothroides</i>	Prickly pear	<i>Opuntia engelmannii</i>
Red barberry	<i>Berberis haematocarpa</i>	Cholla	<i>Opuntia sp.</i>
Crucifixion thorn	<i>Canotia holacantha</i>	Penstemon	<i>Penstemon sp.</i>
Saguaro	<i>Carnegiea gigantea</i>	Mistletoe	<i>Phoradendron sp.</i>
Netleaf hackberry	<i>Celtis reticulata</i>	Pinyon pine	<i>Pinus edulis</i>
Foothill paloverde	<i>Cercidium microphyllum</i>	Tobosa grass	<i>Pleuraphis mutica</i>
Mountain mahogany	<i>Cercocarpus montanus</i>	Velvet mesquite	<i>Prosopis velutina</i>
Sotol	<i>Dasyllirion wheeleri</i>	Scrub live oak	<i>Quercus turbinella</i>
Hopbush	<i>Dodonaea viscosa</i>	Smooth sumac	<i>Rhus glabra</i>
Jojoba	<i>Simmondsia chinensis</i>	Sugarbush	<i>Rhus ovata</i>
Hedgehog spp.	<i>Echinocereus spp.</i>	Skunkbush	<i>Rhus trilobata</i>
Turpentine brush	<i>Ericameria laricifolia</i>	Jojoba	<i>Simmondsia chinensis</i>
Fleabane	<i>Erigeron sp.</i>	Arizona rosewood	<i>Vauquelinia californica</i>
Eriogonum	<i>Eriogonum sp.</i>	Graythorn	<i>Ziziphus obtusifolia</i>
Burroweed	<i>Isocoma tenuisecta</i>		

An area west of the Apache Leap, approximately one km (0.6 mi) in width, is composed of Precambrian and Paleozoic sedimentary rocks (Figure 3). Casual observation of similar outcrops in southern Arizona reveals abrupt transitions in plant species or species abundances between sedimentary rock types as dissimilar as quartzite and limestone, and between more compositionally related sedimentary rocks like limestone and carbonate-rich shale. In order to provide a descriptive account of the vegetation on the sedimentary rocks within the Parcel, a field investigation was conducted on August 9, 2003 up Cross Canyon, starting at the juncture of Cross Canyon with State Highway 177. Although the first km length of the transect is outside of the Parcel, it is included as descriptive of vegetation on Precambrian basalt and Martin dolomite – two rock types that occur on a small southwestern portion of the Parcel that was not visited.

Results of the field investigation (in particular, the distribution of woody plants on the west side of the Leap) demonstrate some of the spatial complexity within this area. Although, Brown's (1994) Interior Chaparral and Sonoran Desertscrub have been delineated essentially along Apache Leap (Figure 8), the observations within Cross Canyon confirm that the Parcel represents more of a transition zone between these two vegetation communities. Some species, like pointleaf manzanita, beargrass (*Nolina microcarpa*), and Wright silktassel, occur only east of Apache Leap in the Chaparral, as would be anticipated. Three other species, jojoba (*Simmondsia chinensis*), foothill paloverde (*Cercidium microphyllum*), and saguaro (*Carnegiea gigantea*), are quintessentially Sonoran Desertscrub species; however each of these appears on some of the hotter, less frost-prone or drier sites on top of the Apache Leap. Others, like scrub live oak, a

major constituent of chaparral on top of the Apache Leap tuff on the Parcel, descend through Cross Canyon nearly to the bottom. Arizona rosewood (*Vauquelinia californica*) occurs in a patchy distribution (near faults, favorable drainages, welded tuffs, and north-facing slopes) here and elsewhere in southern Arizona within both Sonoran Desertscrub and Chaparral. The dense woody vegetation on the north-facing slopes of Naco limestone (west of the Leap) suggests Chaparral, rather than Sonoran Desertscrub, because of its density and the inclusion of pinyon pine (*Pinus edulis*), scrub live oak, smooth sumac (*Rhus glabra*), mountain mahogany (*Cercocarpus montanus*), and other Apache Leap tuff species. However, this Chaparral is somewhat anomalous in its inclusion of crucifixion thorn (*Canotia holocantha*), which is restricted to dolomite and limestones. The giant rosette-forming species, golden flowered agave and sotol, occur both in Cross Canyon and on Apache Leap; they occur only sporadically in Chaparral (on Apache Leap tuff) but both can attain relatively high densities in Sonoran Desertscrub (on Naco limestone). One shrub, jojoba, is widely distributed within Cross Canyon as a Sonoran Desertscrub element but also continues up the tuff slopes on the west side of the Apache Leap.

Geologic- and aspect-based observations within the Sonoran Desertscrub area west of the Leap are outlined below:

- The Troy quartzite supports only a low density of vegetation both on the south- and north-facing slopes. Foothill Paloverde and scattered saguaro are on the south-facing slopes. A low density of small scrub live oak and jojoba occur on the north-facing slopes.
- The Martin dolomite and limestone supports a low density of vegetation on the south-facing slopes, notably patches of teddy bear cholla (*Opuntia bigelovii*) and scattered foothill Paloverde and saguaro. On north-facing slopes, dense stands of crucifixion

thorn, Arizona rosewood, scrub live oak, smooth sumac, sotol, and beargrass.

- The Escabrosa limestone has essentially the same vegetation patterns as the Martin formation with the exception that dense stands of teddy bear cholla are not as noticeable on the south-facing slopes.
- The Naco Formation has the same broad patterns of dense vegetation on the north slopes and open more typically Sonoran Desertscrub on the south slopes as seen on the Martin and Escabrosa Formations. Given the relatively high vegetation, the north-facing slopes of the Naco Formation have been delineated in Figure 8. As described in the above paragraphs, the unique features of these north-facing slopes are the presence of Chaparral species and crucifixion thorn.
- One bedrock formation that was not addressed is the Whitetail Conglomerate which occurs as a narrow, discontinuously exposed outcrop between the Naco Formation and the Apache Leap Tuff. The Whitetail Conglomerate is mantled with talus from the Apache Leap Tuff, and showed no significant variations with the limestone and tuff on either side.

3.2.2. Drought Effects

A significant observation during the summer 2003 field effort was the lack of fruit (or seed) production within the Resolution Parcel, likely resulting from a combination of both the immediate effect of the spring drought in 2003 and the prolonged drought since approximately 1996 (see Section 2.3).

Throughout the Parcel, no berries produced by pointleaf manzanita or one-seed juniper were observed. Berries were not present on the shrubs of chaparral honeysuckle, Wright siltassel, and redberry buck-thorn. The two common oaks, Emory oak and scrub live oak,

with one exception, did not produce acorns. The one exception was several large scrub oaks along the road that traverses Anxiety Fault; these few oaks each had several hundred acorns maturing on the plants in June and July. A careful inspection of Emory oaks growing in the relatively more mesic areas (e.g. above the Oak Creek Reservoir) was conducted. Some of the trees had aborted, undeveloped acorns; none of the Emory oaks were setting mature fruit.

A select few woody species were observed to have produced seed on the Parcel and near vicinity in 2003. Arizona oaks growing beside the perennial reach of Devils Canyon (near the confluence with Hackberry Canyon) produced a modest crop of mature acorns in September. The walnut trees along Queen Creek also produced a significant crop of walnuts in July. Button-bush (*Cephalanthus occidentalis*), in the portions of Devils Canyon and Rancho Rio with sufficient water, produced what appeared to be normal numbers of achene-like fruits. Likewise, mountain mahogany produced large numbers of achenes by August; these achenes, with their long, white, corkscrew-like tails, were observed in abundance on the sand in the dry stream channels.

The species of trees and shrubs on the Resolution Parcel that have the potential for producing large quantities of fruits or nuts under favorable conditions – manzanita, Emory oak, scrub oak, honeysuckle, silktassel, and redberry – produced extremely little or nothing in 2003. The vegetation, in terms of attracting wildlife, was a “still-life” with the only woody plants producing seed either in the wettest portions of the canyons (walnut and Arizona oak) or producing small achenes (button-bush and mountain mahogany) of little consequence for supporting wildlife. It is anticipated that if berries and nuts had been produced by the most abundant species of plants of the chaparral in 2003, wildlife observations would have been more notable (see Section 4). In other more

productive years, robins (*Turdus* sp.) and western bluebirds (*Sialia sialis*) arrive in early winter (October-December) and move as large flocks through the canyons feeding on the berries of honeysuckle, silktassel, and redberry. Bears (*Ursus americanus*), gray foxes (*Urocyon cinereoargenteus*), and coatis (*Nasua narica*) feed on the manzanita and juniper berries. Bears, mule deer (*Odocoileus hemionus*), rodents, and birds such as acorn woodpeckers (*Melanerpes formicivorus*) and band-tailed pigeons (*Columba fasciata*) feed on the acorns. When manzanita and juniper berries and acorns are abundant, the scat from bears and foxes are primarily seeds of these species and the scat is abundant. The productivity of these nuts and berries, therefore, has a significant effect on wildlife.

On the Resolution Parcel, we saw no sign of bears, javelina (*Peccary angulatus*), or coatis and only a few glimpses of gray fox and a few examples of their scat. Deer trails in the small canyons south of No 9 Shaft did not appear to have been used for at least half a year (with only sun-bleached deer pellets on the trail). Survey archaeologists had observed a few mule deer immediately west of Oak Flat in the winter of 2003. Sightings or signs of larger mammals were made in Devils Canyon itself: coatis twice sighted at one spring near Hackberry Canyon, a dead black bear near the confluence of Devils Canyon with Rawhide Canyon, and javelina wallows and trails not uncommon in the canyon bottoms of both Devils Canyon and Rancho Rio.

Additional evidence of the scarcity of acorn resources on the Resolution Parcel was the relative silence of acorn woodpeckers, Mexican jays (*Aphelocoma ultramarina*), and Steller's jays (*Cyanocitta stelleri*). Two Acorn Woodpeckers were observed together in Rancho Rio Creek, a flock of about five Mexican jays in upper Devils Canyon, and a flock of six Steller's jays in a pinyon pine approximately 1.5 km (0.9 miles) southeast of No 9 Shaft. In each case, the observed individuals moved quietly

through the trees, demonstrating no vocalizations or other evidence of territory creation, underscoring the lack of suitable habitat in the existing vegetation community.

3.2.3. Notable Habitat Features

In addition to the vegetation associations described above, additional habitat features, including cliffs, boulders, and water features, occur within the Resolution Parcel.

3.2.3.1. Cliffs and Boulders

Rock outcrops and boulder fields dominate the landscape on the Resolution Parcel. In addition to Apache Leap, other formations created from weathered Apache Leap tuff are evident, including tall spires (or “hoodoos”) (Photo 3-6), precariously stacked rock “totem” formations (Photo 3-7), and large boulders (Photo 3-8), all of which provide habitat for a variety of wildlife species.

Photo 3-6



Photo 3-7



Photo 3-8



Small mammals, birds, and an assortment of reptiles (see Section 4) were observed living or foraging among the rocks. In addition, the ridges and escarpment of Apache Leap provide habitat for a number of raptor species. An active peregrine falcon nest was observed during raptor surveys in this area.

3.2.3.2. Surface Water Features

Surface water features within the Resolution Parcel were mapped through a review of aerial photographs and topographic maps, supplemented by targeted field surveys conducted from April through June 2003. The identified surface water features can be broadly categorized as impoundments (ponds, reservoirs, stock tanks, pools, or tinajas) or

channels (ephemeral or intermittent) (Figure 7). Identification of surface water features was supported while conducting surveys of vegetation and wildlife.

3.2.3.2.1. Impoundments

Within the Resolution Parcel, several manmade impoundment features, ranging from concrete dams to shallow excavations, were identified. These features are summarized below.

Oak Flat Reservoir

Located immediately west of the Oak Flat Campground along Magma Mine Road, this is the largest reservoir within the Parcel (Figure 7; Photo 3-9). This reservoir appears to contain water for most, if not all, of the year and may be spring fed. It collects water from the drainage area immediately upgradient as well.

Photo 3-9



The reservoir outlet consists of a culvert beneath Magma Mine Road (Forest Road 315) which discharges to Drainage N and ultimately to Queen Creek (Photo 3-10).

Photo 3-10



Large trees and snags are found around the margins of the reservoir. A small wetland area less than 75 m² (800 ft²) is located at the outlet immediately upgradient of the culvert that goes under Magma Mine Road. No fish were observed within the reservoir during the surveys. However, two men were observed with a cooler that contained “water dogs” (the larval stage of tiger salamander) that had just been seined from the reservoir.

Dry Reservoir

Dry Reservoir, constructed by means of a concrete dam, is located along Drainage M, south of the Oak Flat Campground (Photo 3-11). Although this reservoir contained no surface water during the field investigations, it supported relatively dense vegetation, including herbaceous species less common in the adjacent uplands.

Photo 3-11



The area immediately surrounding the reservoir is relatively flat and supports a stand of Emory oak and western cottonwood (Photo 3-12). An active Cooper's hawk nest is located in one of the cottonwood trees.

Photo 3-12



Downstream from this reservoir, Drainage M becomes dominated by large boulders.

Dry Pond

Dry Pond is located on the northeast side of the Oak Flat area, and was visited several times in the winter and spring of 2003. No more than 0.3 meter of water was observed in this pond during this survey period and it does not appear to provide suitable habitat for fish or other aquatic life. During the drier month of May, the pond was observed to support spike rush (*Eleocharis macrostachya*), indicating the presence of moist soil (Photo 3-13).

Photo 3-13



Drill Road Stock Ponds

There are four (4) stock ponds along the access road (FR 315) used during exploration drilling on the eastern side of Apache Leap (Figure 7). These ponds are located within drainages that originate on Apache Leap and flow towards the east and north, ultimately to Queen Creek. All of these stock ponds were developed as shallow excavations within an existing, natural drainage system, the largest of which (Drill Road Stock Pond) is supported by a small earthen berm at the downstream end.

Photos 3-14 through 3-17, below, taken in May 2003, show the stock ponds from the southernmost to the northernmost pond.

Photo 3-14



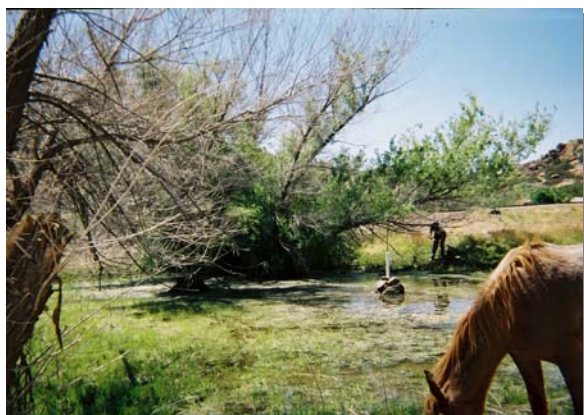
Photo 3-15



Photo 3-16



Photo 3-17



These stock ponds were visited five times from April through June 2003. The surface water levels within the stock ponds diminished with each visit, with considerably less water in June than in April. When the ponds were visited in June, the southernmost (smaller) tanks were dry and the larger tanks on the northern end of the Drill Road had diminished significantly. Evidence (tracks, scat, etc.) that cattle, horses, and wildlife use these ponds was noted during each visit.

In general, these stock tanks are ephemeral, capturing and storing water from precipitation events, and do not provide suitable habitat for most aquatic species. Breeding populations of non-native tiger salamander (a popular live bait for fishing nearby rivers and lakes) has been established in several of the stock tanks.

Apache Leap Stock Pond

Located on the southwest portion of the Parcel on the crest of Apache Leap, this pond contained water during the May 2003 visit (Photo 3-18).

Photo 3-18



3.2.3.2.2. Channels

Channels or drainages on the parcel include two named drainages, Queen Creek and Rancho Rio Creek, as well as a number of ephemeral washes that have been designated with letters for the purposes of this report (Figure 7). Habitat associations along Queen Creek are documented in Section 3.2.2.1. This section focuses on letter-designated ephemeral drainages and associated features within the Parcel. One such associated feature type is the tinaja, a small ephemeral water catchment that forms in the eroded rock outcrops that line many of the ephemeral drainages within the Parcel. These catchments create microhabitats for a variety of plants, animals, and invertebrates, and can be important sources of water for a number of wildlife species, including amphibian species such as the canyon tree frog. Fourteen ephemeral drainages, which ultimately discharge to Queen Creek or Rancho Rio Creek, were identified east of the Apache Leap.

Drainages A, B, K, and L originate just east of Apache Leap, eventually discharging into Queen Creek. These drainages are primarily boulder

and bedrock-dominated channels with occasional surface water present within tinajas.

Drainage K was visited on April 16, 2003, at which time four surface water pools were noted, and June 10, 2003 at which time only two pools were noted (Photo 3-19).

Photo 3-19



Drainage L was visited on June 9, 2003 at which time it still supported four pools (Photo 3-20).

Photo 3-20



Drainage L may support surface water longer than the other identified ephemeral drainages due to a higher ground water table. This drainage is boulder dominated and extremely rugged with stretches where the drainage occurs at a greater than 45 degree slope.

Drainages C through H originate just east of Apache Leap, ultimately discharging into Rancho Rio Creek and eventually to Devils Canyon. These drainages, visited on April 15 and 16, 2003, are primarily dry, bedrock channels with occasional surface water present within tinajas.

Drainage I runs through the northern portion of the Resolution Parcel, north of Highway 60, running essentially parallel to, and eventually discharging to, Queen Creek.

Drainage J flows generally from south to north, joining with Drainages D, L, and M and eventually discharging to Queen Creek. This drainage was visited on May 15, 2003, at which time five water-filled tinajas were noted, including a sixth in a small, unnamed channel tributary to Drainage J (Figure 7; Photo 3-21).

Photo 3-21



Drainage M, flowing generally from east to west just south of the Oak Flat Campground, joins Drainages D, J, and L and eventually discharges to Queen Creek. Dry Reservoir is located along this drainage (see above). The channel downstream from the dam is dominated by large boulders, making access difficult. As such, this reach of Drainage M was not visited, and tinajas were identified from a vantage point looking down into the drainage (Figure 7).

Drainage N occurs north of the Parcel, crossing beneath the highway and through the Oak Flat Campground into Oak Flat Reservoir. As described above, discharges from the reservoir flow back into Drainage N and ultimately to Queen Creek.

Photo 3-22



No surface water was noted within this drainage upgradient of the reservoir. During a May 16, 2003 visit, some water was noted in downgradient portions of the drainage, within approximately 100 m (328 ft) of the reservoir outlet (Photo 3-22).

3.2.3.3. Shafts and Adits

As previously noted, the Resolution Parcel is located in an historic mining district that has

been prospected, explored, and mined since the mid-19th Century. Shafts, adits, and exploration locations dot the west side of Apache Leap, especially on the slopes west of the Parcel boundary (Photo 3-23). Within one adit, a gate was installed by BHP to insure human safety while providing access for bats.

Photo 3-23



4.0 GENERAL WILDLIFE

As described in Section 3, two broad habitat types occur within the Resolution Parcel boundaries – Interior Chaparral (east of Apache Leap and the dominant biotic community in the

project area) and Sonoran Desertscrub (west of Apache Leap). Brown (1994) provides an abbreviated list of the types of species expected to be found in Interior Chaparral (Table 4-1).

Table 4-1. Wildlife occurring in the Interior Chaparral habitat type (Brown 1994).

Common Name	Scientific Name	Common Name	Scientific Name
Mammals			
Cliff chipmunk	<i>Eutamias dorsalis</i>	Rock mouse	<i>Peromyscus difficilis</i>
White-throated woodrat	<i>Neotoma albigula</i>	White-footed mouse	<i>Peromyscus leucopus</i>
Mule deer	<i>Odocoileus hemionus</i>	Brush mouse	<i>Peromyscus boylii</i>
Eastern cottontail	<i>Sylvilagus floridanus holzeri</i>		
Birds			
Canyon wren	<i>Catherpes mexicanus</i>	Brown towhee	<i>Pipilo fuscus</i>
Rufous-sided towhee	<i>Pipilo erythrophthalmus</i>	Bushtit	<i>Psaltiriparus minimus</i>
Crissal thrasher	<i>Toxostoma dorsale</i>	Black-chinned sparrow	<i>Spizella atrogularis</i>
Rufous-crowned sparrow	<i>Aimophila ruficeps</i>	Scrub jay	<i>Aphelocoma coerulescens</i>
Amphibians and Reptiles			
Glossy snake	<i>Arizona elegans</i>	Desert striped whipsnake	<i>Masticophis taeniatus</i>
Western rattlesnake	<i>Crotalus viridis</i>	Western fence lizard	<i>Sceloporus occidentalis</i>
Arizona alligator lizard	<i>Gerrhonotus kingi</i>	Eastern fence lizard	<i>S. undulatus</i>
Night snake	<i>Hypsiglena torquata</i>	Western blackhead snake	<i>Tantilla planiceps</i>
Sonora mountain kingsnake	<i>Lampropeltis pyromelana</i>	Sonoran lyre snake	<i>Trimorphodon biscutatus lambda</i>
Southwestern blind snake	<i>Leptotyphlops humilis</i>	Texas lyre snake	<i>Trimorphodon biscutatus wilkinsoni</i>
Sonora whipsnake	<i>Masticophis bilineatus</i>	Side-blotched lizard	<i>Uta stansburiana</i>
Arizona night lizard	<i>Xantusia arizonae</i>		

This species list does not provide a comprehensive species list for the project area. Given the wide variety of factors influencing wildlife species composition within a particular habitat type (e.g. habitat transitions, availability of water, etc.), additional analysis (including a literature review; field reconnaissance; and obtaining information from state and federal agencies, and local organizations) was utilized

to determine those species with the potential to occur within the project area.

4.1. METHODS AND MAPPING CONVENTIONS

4.1.1. Mammals

Efforts to identify mammal species potentially occurring within the Resolution Parcel included:

1) review of relevant literature, 2) anecdotal observation during field reconnaissance, and 3) written and verbal correspondence with state and federal agencies, and local organizations. No species-specific mammal surveys were conducted for this assessment.

The following were contacted for information regarding potential mammal species within the Parcel: Arizona Game and Fish Department (AGFD); US Forest Service (USFS); US Fish & Wildlife Service (USFWS); and Boyce Thompson Arboretum. The AGFD provided harvest and survey data for various game species within relevant game management units. Additional harvest and survey data was provided by Ms. Amber Munig of AGFD on April 23, 2003 (Appendix B).

Additional information sources included an online search of the USFWS Fire Effects Information System (FEIS) database, a USFS general species account for Tonto National Forest, and a checklist of species provided by Boyce Thompson Arboretum, located approximately 11 km (6 miles) west of the Parcel. Finally, two bat survey reports completed by Bat Conservation International (BCI 1996 and 1997) within abandoned underground mine workings near Superior, Arizona were reviewed.

4.1.2. Reptiles and Amphibians

4.1.2.1. Amphibian Survey Methods

Amphibian surveys, in general, involved visual observation at surface water sources, capture, and in-hand identification. Focused field surveys for amphibians were scheduled to coincide with the active season for ranid frogs, which occurs from April through October, and/or during wet periods after spring runoff or rainfall, when ranid frogs are more visible (Sredl 1997).

In order to maximize the survey effort, surveys for amphibian species were conducted when

water temperatures reached 14°C or above, when the amphibians would be most active. Surveys for Chiricahua leopard frog and lowland leopard frog followed the General Visual Encounter Survey Method (VEM) protocol developed by the U.S. Fish and Wildlife Service (USFWS 2003b). The Chiricahua Leopard Frog VEM Form was used in collecting locality data, site and visit conditions, and herpetofauna observations for all known surface water features on the Resolution Parcel (Figure 7).

4.1.2.2. Reptile Survey Methods

Similar to amphibian surveys, surveys for reptiles involved visual observation and identification, and were completed in conjunction with other biological and resource surveys conducted as part of the baseline biological inventory. These surveys typically consisted of relatively wide-ranging walking transects through a variety of habitat types and geologic features. Reptile surveys were also conducted while traveling during field reconnaissance for other biological surveys. Reptiles are routinely observed “sunning” on rocks or open ground during early morning hours and moving across roads at night. Nighttime observation of roadways were used to supplement the walking transects and observations during other biological surveys.

4.1.3. Birds

4.1.3.1. Raptor Survey Methods

The Parcel was surveyed for the presence of raptors on May 22 and 23, 2003 during the known raptor nesting/breeding season, with particular focus on areas containing appropriate nesting substrates such as cliff faces, rock outcrops, utility poles, and large trees. Survey methodology included linear transects, variable transects, and cliff surveys, all of which are described briefly below.

In general, linear transects are utilized in order to sample large areas in a relatively short period of time (Cooperrider et.al. 1986). Linear transects were conducted along Queen Creek and two tributary drainages near the western portion of Oak Flat. These narrow canyon bottoms contain riparian groves of sycamore, velvet ash, and Emory oaks that provide potential nest trees for raptors (Figure 9). Surveyors proceeded slowly on foot along transects, scanning the treetops with binoculars for evidence of raptors or their nests.

Variable transects were conducted in larger areas containing groves of cottonwoods, oaks, and other trees as well as in areas where steep topography and rock outcrops provided potential nest sites. Observers conducting variable transects moved through the survey areas in a meandering fashion, scanning all appropriate nest substrates with binoculars.

Cliff surveys were conducted on the face of Apache Leap from four fixed points located at intervals along the length of the cliff. Surveyors scanned the cliff face with the aid of binoculars and spotting scopes for a period of two hours. Observations took place during the early morning hours from ½ hour before sunrise until four hours after sunrise for three of the survey points. Surveys at the fourth fixed point were conducted in the late afternoon. Evidence of raptor habitation, including stick nests, whitewash, and observations of raptors themselves, was recorded on data forms. If raptors were present, behavioral observations were used to determine breeding status. Specific indicators of breeding activities include (Postupalsky 1974):

- Presence of a nest or eyrie¹
- Young in nest
- Adult in nest in incubation posture
- Mating behavior

¹ The eyries of cliff nesting raptors can consist of a stick nest, scrape, ledge, or cavity.

- Prey deliveries
- Nest maintenance
- Adult near nest

4.1.3.2. Other Bird Survey Methods

With the exception of raptors, no species-specific surveys were conducted for birds in the Parcel. However, during general biological investigation work on the Parcel, WestLand biologists noted birds that were observed and/or heard within or near the Parcel.

4.2. RESULTS

4.2.1. Mammals

Mammals identified within the Parcel, either through direct observation or identification of scat or tracks, are listed in Table 4-2.

Table 4-2. Mammal species observed within the Parcel.

Common Name	Scientific Name
Black-tailed jack rabbit	<i>Lepus californicus eremicus</i>
Desert cottontail	<i>Sylvilagus audubonii</i>
Rock squirrel	<i>Spermophilus variegatus</i>
White-throated wood rat	<i>Neotoma albigula albigula</i>
Black bear	<i>Ursus americanus</i>
Raccoon	<i>Procyon lotor</i>
Ringtail	<i>Bassariscus astutus arizonensis</i>
Coyote	<i>Canis latrans</i>
Gray fox	<i>Urocyon cinereoargenteus</i>
White-tailed deer	<i>Odocoileus virginianus couesi</i>

Because most of the mammal species which occur in Arizona are nocturnal or crepuscular, they are difficult to observe directly through field investigation. Based on the review of agency provided information and published literature,

including review of spatial distribution and habitat requirements of Arizona mammal species, it was determined that the following species also have the potential to occur within the Parcel (Table 4-3).

Table 4-3. Mammal species that have potential to occur on the Parcel.

Common Name	Scientific Name	Common Name	Scientific Name
Desert shrew	<i>Notiosorex crawfordi crawfordi</i>	Porcupine	<i>Erethizon dorsatum</i>
California leaf-nosed Bat	<i>Macrotus californicus</i>	Mexican wood rat	<i>Neotoma mexicana</i>
Cave myotis	<i>Myotis velifer</i>	Harris' antelope squirrel	<i>Ammospermophilus harrisi</i>
California myotis	<i>Myotis californicus californicus</i>	Arizona pocket mouse	<i>Perognathus amplus amplus</i>
Western pipistrelle	<i>Pipistrellus hesperus hesperus</i>	Rock pocket mouse	<i>Perognathus intermedius intermedius</i>
Townsend's (or Western) big-eared bat	<i>Plecotus townsendii</i>	Merriam's kangaroo rat	<i>Dipodomys merriami merriami</i>
Mexican free-tailed bat	<i>Tadarida brasiliensis mexicana</i>	Brush mouse	<i>Peromyscus boylii rowleyi</i>
Western mastiff bat	<i>Eumops perotis</i>	Western harvest mouse	<i>Reithrodontomys megalotis</i>
Yuma myotis	<i>Myotis yumanensis</i>	Stephen's wood rat	<i>Neotoma stephensi</i>
Fringed myotis	<i>Myotis thysanodes thysanodes</i>	Deer mouse	<i>Peromyscus maniculatus sonoriensis</i>
Small-footed myotis	<i>Myotis ciliolabrum</i>	Porcupine	<i>Erethizon dorsatum</i>
Big brown bat	<i>Eptesicus fuscus</i>	Spotted skunk	<i>Spilogale putorius leucoparia</i>
Pallid bat	<i>Antrozous pallidus</i>	Striped skunk	<i>Mephitis mephitis</i>
Pocketed free-tailed bat	<i>Nyctinomus femorosaccus</i>	Hog-nosed skunk	<i>Conepatus mesoleucus venaticus</i>
Hoary bat	<i>Lasiurus cinereus</i>	Hooded skunk	<i>Mephitis macroura milleri</i>
Cliff chipmunk	<i>Eutamias dorsalis dorsalis</i>	Mountain lion	<i>Felis concolor</i>
Baileys' pocket mouse	<i>Perognathus baileyi baileyi</i>	Bobcat	<i>Felis rufus</i>
Desert pocket mouse	<i>Perognathus penicillatus pricei</i>	Kit fox	<i>Vulpes macrotis macrotis</i>
Cactus mouse	<i>Peromyscus eremicus eremicus</i>	Javelina	<i>Tayassu tajacu</i>
Southern grasshopper mouse	<i>Onychomys torridus</i>	Mule deer	<i>Odocoileus hemionus</i>

Particular attention was given to bat species, given the migratory habits of most bat species and the associated winter and summer ranges (Hoffmeister 1986). The BCI reports (BCI 1996 and 1997) identified four bat species near the

Parcel during systematic surveys of abandoned mines in and near the Parcel. These include: the western big-eared bat (*Corynorhinus [Plecotus] townsendii*), big brown bat (*Eptesicus fuscus*), western pipistrelle (*Pipistrellus*

hesperus [*hesperus*]), and fringed myotis (*Myotis yumanensis*).

During field reconnaissance, unidentified bats were observed utilizing the Oak Flat Reservoir, feeding on mosquitoes or other small flying insects over the water's surface.

The Parcel is located within Game Management Units 24A and 24B, as designated by AGFD. Although the Parcel lies predominately within Unit 24A, due to irregular boundary designations, Unit 24B is more representative of the habitat type and species composition found within the Parcel. Game species data for Unit 24B, provided by AGFD. Note that the data provided below is for the entirety of Unit 24B, which comprises approximately 225,000 hectares (550,000 acres). The Parcel, as described previously, is approximately 1,225 hectares (3,025 acres) in size, or approximately 0.6 percent the size of Game Management Unit 24B.

- Black bear numbers tend to be low within the Unit and bear harvest was two (2) individuals for the 2002-2003 hunting season.
- Javelina occur throughout most of the Unit, with herd sizes averaging nine animals. Javelina harvest was 167 individuals for the 2002-2003 hunting season; survey for javelina during this period identified 83 animals.
- Mule deer are found throughout most of the Unit in areas that are generally below 4,500 feet in elevation. There has been a decline in mule deer numbers over the past ten years presumably due to inconsistent rainfall patterns. Mule deer harvest within the Unit was 73 individuals for the 2002-2003 hunting season; survey for mule deer during this period identified 147 animals.
- White-tailed deer may be found throughout most of the Unit, generally within brushier

habitats above 3,500 feet in elevation. Habitat within the Parcel, particularly in the chaparral east of Apache Leap is consistent with that known to support white-tailed deer. White-tailed deer harvest within the Unit was 104 individuals for the 2002-2003 hunting season; survey for white-tailed deer during this period identified 66 animals.

- While mountain lion was not identified in the Hunting Report as a species found within the Unit, the lion harvest data identified five individuals taken for the 2002-2003 hunting season.

4.2.2. Reptiles and Amphibians

4.2.2.1. Amphibians Results

Within the Resolution Parcel, amphibian survey areas included portions of Queen Creek and several of its tributaries, as well as several scattered reservoirs, ponds, and stock tanks (Figure 7). Ranid frog survey of the Resolution Parcel occurred on April 16, May 14, 15, and 16; May 30 and 31; and June 9 and 10, 2003.

It should be noted that there are no confirmed perennial water sources within the Parcel. Queen Creek is an intermittent stream within the Parcel reach, and the remaining drainages are all ephemeral. All of the reservoirs, ponds, and stock tanks within the Parcel appear to be ephemeral as well, with the possible exception of the Oak Flat Reservoir. Additional discussion of surface water features within the project area is provided in Section 3.2.4.2 of this report.

At the time of field visits, the drainages within the Resolution Parcel contained isolated pools of water within tinajas. The stock tanks and small tinajas that maintained surface water through June were the features where most amphibian individuals were observed. Canyon tree frogs (larvae and adults) and a red spotted toad were noted within only one ephemeral drainage on the Parcel (Drainage L).

While no amphibians were noted within the reach of Queen Creek in the Parcel, tadpoles (including canyon tree frog larvae) were noted within the stream just west of the Parcel boundary. It is anticipated that amphibians occur within all reaches of Queen Creek where sufficient surface water or moisture is present.

Table 4-4 provides a list of amphibians that were noted during field reconnaissance of the Parcel.

Table 4-4. Amphibians noted during field reconnaissance of the Parcel.

Common Name	Scientific Name
Canyon tree frog	<i>Hyla arenicolor</i>
Tiger salamander	<i>Ambystoma tigrinum</i>
Red spotted toad	<i>Bufo punctatus</i>

Photo 4-1 shows an adult canyon tree frog.

Photo 4-1



Canyon tree frog larvae were also noted within Queen Creek just west of the Parcel boundary (Photo 4-2).

Photo 4-2



In general, canyon tree frogs were noted in areas that contained pools set in water-polished bedrock providing relatively safe haven from predators. No canyon tree frogs were observed within water features where tiger salamander larvae were present, presumably due to the fact that tiger salamander larvae predate upon amphibian egg masses and larvae.

Tiger salamander larvae were noted within the Drill Road Stock Pond and Oak Flat Reservoir. Different larval stages of tiger salamander were noted on April 16 (Photo 4-3), May 15 and 16, and May 30.

Photo 4-3



4.2.2.2. Reptiles Results

As described above, the Interior Chaparral habitat biotic community dominates the Resolution Parcel and the reptile relationships within chaparral are generally ill-defined (Brown 1994). Essentially, every habitat type within the Resolution Parcel can be utilized by reptiles, and the presence of the rock and boulder formations on the parcel provide numerous opportunities for reptile shelter.

Table 4-5 provides a list of reptiles that were noted during field reconnaissance of the Resolution Parcel.

Table 4-5. Reptiles noted during field reconnaissance of the Resolution Site.

Common Name	Scientific Name
Collared lizard	<i>Crotaphytus collaris</i>
Greater earless lizard	<i>Holbrookia texana</i>
Zebra-tailed lizard	<i>Callisaurus draconoides</i>
Desert spiny lizard	<i>Sceloporus magister</i>
Tree lizard	<i>Urosaurus sp.</i>
Side-blotched lizard	<i>Uta stansburiana</i>
Regal horned lizard	<i>Phrynosoma solare</i>
Western whiptail	<i>Cnemidophorus tigris</i>
Black-necked garter snake	<i>Thamnophis cyrtopsis</i>
Gopher snake	<i>Pituophis melanoleucus</i>
Western diamondback rattlesnake	<i>Crotalus atrox</i>
Tiger rattlesnake	<i>Crotalus tigris</i>

Photo 4-4 shows an adult breeding male collared lizard sunning.

Photo 4-4



Photo 4-5 shows a tree lizard sunning.

Photo 4-5



4.2.3. Birds

4.2.3.1. Raptor Results

Three active raptor nests were observed on the Parcel during the field survey. On May 22, 2003 a Cooper's hawk (*Accipiter cooperii*) nest was found in an Emory Oak located immediately downgradient of Dry Reservoir, near the Oak Flat Campground (Figure 9).

An adult male Cooper's hawk was observed low in the nest in an incubation or brooding posture, indicating that the nest contained either eggs or small fledglings. The presence of two fledglings was confirmed on a subsequent field visit completed on June 10, 2003.

On May 23, 2003 an active American peregrine falcon (*Falco peregrinus anatum*) was detected

on the face of Apache Leap (Figure 9) (Photo 4-6).

Photo 4-6



The adult peregrine was observed moving from perch to perch along the cliff face while at least two fledglings could be heard vocalizing from the vicinity of a large vertical fissure on the cliff face. At the end of the observation period, there was a series of strident vocalizations from the young indicating a prey delivery.

A single active Zone-tailed hawk (*Buteo albonotatus*) nest was observed in Queen Creek during riparian survey. Young from this nest were observed to have successfully fledged (being fully feathered and perched on branches

well outside the nest) during 2003. In addition, two other active Zone-tailed hawk nests were observed in proximity to the Parcel in 2003 – one on Queen Creek downgradient of the Parcel and one within Devils Canyon.

Also observed adjacent to the Parcel were common blackhawks (*Buteogallus anthracinus*) within Devils Canyon. Individual blackhawks were observed on two separate occasions in June 2003; no nests or nesting behaviors were noted during these observations.

Numerous turkey vultures (*Cathartes aura*) were observed soaring along Apache Leap and throughout the Parcel in general. There is a well known turkey vulture communal roost located at the Boyce Thompson Arboretum where up to 100 individuals congregate nightly (Glinski 1998).

4.2.3.2. Other Bird Results

There are four different groups of bird species that are anticipated to occur or potentially occur on the Parcel: (1) resident birds, (2) riparian birds, (3) spring and fall migratory birds, and (4) occasional visitors. Anticipated species from each group are identified in Table 4-6.

Table 4-6. Bird species observed or anticipated to occur on the Parcel.

Group	Common Name	Scientific Name
Resident		
Chaparral	Rock wren	<i>Salpinctes obsoletus</i>
	Canyon wren	<i>Catherpes mexicanus</i>
	Rufous-crowned sparrow	<i>Aimophila ruficeps</i>
	Spotted (rufous-sided) towhee	<i>Pipilo maculatus</i>
	Canyon towhee	<i>Pipilo fuscus</i>
	Gambel's quail	<i>Callipepla gambelii</i>
	Morning dove	<i>Zenaida macroura</i>
	White-winged dove ¹	<i>Zenaida asiatica</i>
	Lesser nighthawk	<i>Chordeiles acutipennis</i>
Sonoran Desertscrub ²	Verdin	<i>Auriparus flaviceps</i>
	Curve-billed thrasher	<i>Toxostoma curvirostre</i>

Table 4-6. Bird species observed or anticipated to occur on the Parcel.

Group	Common Name	Scientific Name
	Mockingbird	<i>Mimus polyglottos</i>
	Cactus wren	<i>Campylorhynchus brunneicapillus</i>
	Cardinal	<i>Cardinalis cardinalis</i>
	Phainopepla	<i>Phainopepla nitens</i>
	Gila woodpecker	<i>Melanerpes uropygialis</i>
	Greater roadrunner	<i>Geococcyx californianus</i>
Riparian	Black phoebe	<i>Sayornis nigricans</i>
	Lesser goldfinch	<i>Carduelis psaltria</i>
	Great blue heron	<i>Ardea herodias</i>
	Warblers ¹	Family Parulidae
	Flycatchers	Family Tyrannidae
	Bullock's oriole	<i>Icterus bullockii</i>
	Hooded oriole	<i>Icterus cucullatus</i>
	Violet-green swallows ¹	<i>Tachycineta thalassina</i>
	Cliff swallow ¹	<i>Petrochelidon pyrrhonota</i>
Spring and Fall Migrants	Migrant warblers, hummingbirds, flycatchers, buntings	
Occasional Visitors	Steller's jay	<i>Cyanocitta cristata</i>
	Mexican jay	<i>Aphelocoma ultramarina</i>
	Raven	<i>Corvus cryptoleucus</i>
	Acorn woodpecker	<i>Melanerpes formicivorus</i>
	Brown-headed cowbirds	<i>Molothrus ater</i>
	Bridled titmouse	<i>Baeolophus wollweberi</i>
	Oak titmouse	<i>Baeolophus inornatus</i>
	Blue-gray gnatcatcher	<i>Poliophtila caerulea</i>
	Bewick's wren	<i>Thryomanes bewickii</i>
	Dark-eyed junco	<i>Junco hyemalis</i>
	Robin	<i>Turdus migratorius</i>
	Western bluebird	<i>Sialia mexicana</i>

¹Occurring in summer.²May be found within chaparral east of the Leap as well.

As described in Section 3.2.2, the Parcel is not an extraordinarily productive area (in terms of grass seeds, other herbaceous seeds, nuts, berries, and presumably insects) and the recent drought further depresses productivity. In

addition, the wet areas are relatively open; more bird species would be anticipated to occur in these areas if stands of cattail, bulrush, etc. were found there.

5.0 SPECIAL-STATUS SPECIES

5.1. SPECIES IDENTIFICATION

Special-status species lists for the region inclusive of the Parcel were obtained from the Arizona Ecological Field Office of USFWS Internet Web page, the Heritage Database Management System (HDMS) operated by the Arizona Game & Fish Department (AGFD), and from TNF. The HDMS data request made to AGFD resulted in a list of special-status species known to occur within three miles of the Parcel. Special-status species lists received from these agencies and subsequently used in our screening analysis are provided in Appendix B.

The list of species to be considered in detail in this document, compiled from the general lists described above, was shortened using an internal screening process (Appendix C). To complete the initial screening analysis, WestLand personnel reviewed the agency species lists and additional available literature on the natural history and habitat preferences of the special-status species. Published species-specific information such as preferred habitats, elevation ranges, reliance on water resources, known seasonal ranges, and other related information was compiled and compared with

the general characteristics of the Parcel in order to establish an initial list of species which could potentially occur in the project area.

The findings of our initial screening analysis are summarized in the table provided in Appendix C and include: 1) endangered species, 2) threatened species, 3) proposed/candidate species, 4) Tonto National Forest sensitive species, and 5) AGFD Wildlife of Special Concern in Arizona (WSCA). Eighty-nine special-status species, including 17 endangered, 5 threatened, 1 proposed endangered, 2 candidate, and 64 Forest Sensitive and/or WSCA species (not otherwise listed), were identified as potentially occurring in either: 1) Pinal County or 2) within the boundaries of Tonto National Forest. Of those 89, 12 species (2 endangered and 10 Forest Sensitive or WSCA) were determined to occur or to have some potential to occur on the Parcel. These species are listed in Table 5-1 and discussed in detail in below.

Table 5-1. Special-status species known to occur or with potential to occur on the Parcel

Species Identified	Official Status
Plants	
Arizona hedgehog cactus ("ETA") (<i>Echinocereus triglochidiatus arizonicus</i>)	USFWS – endangered
Reptiles and Amphibians	
Sonoran desert tortoise (<i>Gopherus agassizii</i>)	Forest Sensitive; WSCA
Lowland leopard frog (<i>Rana yavapaiensis</i>)	Forest Sensitive; WSCA
Arizona night lizard (<i>Xantusia vigilis arizonae</i>)	Forest Sensitive
Gila monster (<i>Heloderma suspectum</i>)	Forest Sensitive

Table 5-1. Special-status species known to occur or with potential to occur on the Parcel

Species Identified	Official Status
Birds	
American peregrine falcon (<i>Falco peregrinus anatum</i>)	Forest Sensitive; WSCA
Common blackhawk (<i>Buteogallus anthracinus</i>)	Forest Sensitive; WSCA
Mammals	
Lesser long-nosed bat (<i>Leptonycteris curasoae yerbabuenae</i>)	USFWS – endangered
Allen's big-eared bat (<i>Idionycteris phyllotis</i>)	Forest Sensitive
California leaf-nosed bat (<i>Macrotus californicus</i>)	Forest Sensitive; WSCA
Spotted bat (<i>Euderma maculatum</i>)	Forest Sensitive; WSCA
Townsend's big-eared bat (<i>Corynorhinus townsendii</i>)	Forest Sensitive

Following the literature search and review, field investigations were conducted to examine the vegetation communities and habitat characteristics of the Parcel. Relevant field activities included general reconnaissance and observational surveys, some species-specific surveys, and mapping of vegetation, water features, and other unique habitat elements. Detailed vegetation mapping and habitat analyses used to complete this analysis are provided in Section 3 of this baseline report. In order to make each species account discussion stand alone, basic information about survey methods and general habitat on the Parcel have been repeated as necessary for each of the species analyzed in detail.

5.2. SPECIES EVALUATION

5.2.1. Arizona Hedgehog Cactus (*Echinocereus triglochidiatus* var. *arizonicus*; ETA)

Arizona hedgehog cactus (ETA) is classified as federally-listed endangered without critical habitat. ETA is one of 1,700 native plants that was proposed for designation as an endangered species by the USFWS on June 16, 1976

(USFWS 1976). On October 25, 1979, USFWS published the final rule designating ETA as an endangered species (USFWS 1979). This designation includes its entire range in Arizona. It was listed due to its limited distribution, which was determined to exacerbate its vulnerability to threats from mining, offroad vehicle use, illegal collecting, and road and utility construction. There is some confusion with regard to the identification of this taxon. Published descriptions vary significantly across the region (Cedar Creek Associates).

5.2.1.1. Data Sources and Inventory Methods – Arizona hedgehog cactus

WestLand personnel conducted a literature and file search to obtain current information regarding the range and habitat requirements of ETA. Two recent projects, the OMYA limestone quarry expansion (located immediately north of the Parcel, north of US 60) and the Carlota Project (a proposed new mine located approximately 13 kilometers [8 miles] east of the Parcel), have each provided new information about ETA distribution as a result of their survey and data collection efforts. The most helpful of this latter information is from unpublished and confidential sources associated with approvals

for the Carlota Project prepared by Cedar Creek Associates. For the purposes of this analysis, the Forest Service has allowed this information to be used (Craig Wood pers. comm.).

Within the Parcel, surveys were conducted by Resolution's contractors in 2001 in conjunction with approvals for a drilling exploration program. In addition, during peak flowering time (April) in 2003, areas of the Parcel with potential ETA habitat were sample surveyed by WestLand to detect ETA by walking transects through potentially suitable habitat and searching hill sides with binoculars to detect conspicuous, flowering ETA. This methodology does not constitute 100 percent survey coverage of this portion of the Parcel. Areas where species-specific ground surveys and flowering general surveys have occurred are shown on Figure 10.

As described above, road surveys for ETA were conducted on the Parcel in the spring of 2003 while plants were flowering. ETA produces characteristic distinctive scarlet red flowers, which are visible from several hundred feet away, depending on terrain and vegetation coverage. Using this brief flowering period to advantage, WestLand conducted wide-area pedestrian surveys of drainages on the east and west sides of Apache Leap, around the campground areas, and along US 60. The wide-area surveys were supplemented by glassing (with 10X binoculars) steep and inaccessible areas that exhibited habitat features consistent with ETA preferences. Binocular surveys were conducted from points 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.

When a suspected Arizona hedgehog cactus was located during the survey, positive identification was made by identifying the rib pattern, spine characteristics, and other distinctive characteristics described for ETA. This cactus has 10 robust tuberculate ribs with

one to three gray or pinkish central spines (the largest central spine deflexed with minute striations 2.5 to 4.0 cm [1.0 to 1.5 in] long), and five to eleven radial spines that are slightly curved. Field personnel measured the length (in cm) of the central spine and main stem, and the diameter (in cm) of the main stem and entire plant cluster.

GPS location coordinates (in NAD 27 datum) and site-specific information were recorded on the *Arizona Hedgehog Cactus Survey Data Sheet* and at least two photographs of the cactus and surrounding area taken. Data recorded on the survey data sheet includes: project information, location and weather data, observation point data, descriptive information and measurements of the cactus, and photograph data. Approximate locations of cactus identified during the survey were marked on a 1:200 scale field map/aerial photograph. The physical locations of individual cactus specimens were not marked in the field.

5.2.1.2. Potential for Occurrence – Arizona hedgehog cactus

ETA is found in Pinal County in the vicinity of Dripping Springs, the Superstition and Mescal mountains, the highlands between Globe and Superior, in Devils Canyon and Queen Creek along the Gila/Pinal County line, and is also found in Gila County. Known habitat requirements include open slopes or the understory of a more open canopy in cracks and crevices between boulders (USFWS 2001), rather than the dominant dense shrub overstory of the Interior Chaparral biome (AGFD 1997).

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). Results of Cedar Creek's observations of more

than 1,000 specimens, located during field surveys for the nearby Carlota Project, indicate that ETA prefers more stable rock formations such as the Apache Leap tuff and Schultze granite. These rock types weather very slowly, forming stable ridges and outcrops which provide opportunities for ETA to establish and grow (Cedar Creek). 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 creating a soil substrate that is colonized by dense stands of vegetation (Cedar Creek) and do not appear to be used by ETA to the same extent.

One plant was identified within the Parcel at the Oak Flat Campground, during the wide-area survey. While 100 percent pedestrian survey has not been completed for the Parcel, surveys to date indicate that much of this area is not occupied by ETA. The predominant rock type on the Parcel east of Apache Leap is the Apache Leap tuff, one of the geologic formations typically associated with ETA habitat. This tuff formation covers approximately 90 percent of the Parcel (Figure 3). No obvious reasons for the veritable absence of ETA on the south side of US 60 are apparent. However, the Apache Leap tuff is comprised of several layers with various degrees of weathering or “welding” (i.e., brown [densely welded]; gray and vitrophyre [partly welded]; basal, top of white, upper white, lower white [unwelded]) (Gant 2003). Some of these layers may provide a more suitable substrate for ETA than others.

5.2.2. Lesser Long-nosed Bat (*Leptonycteris curasoae yerbabuenae*; LLNB)

Lesser long-nosed bat (LLNB) is classified as federally-listed endangered without critical habitat (USFWS 1988). The LLNB is considered endangered throughout its range in the United States and Mexico (USFWS 1995). The federal

listing was based on apparent declines in populations in Arizona and Mexico and the lack of formal protection for the species and its habitat (including agaves as a food source) (BISON 2003). Controversy exists in the scientific community regarding the status of this species in Arizona. Colonies of LLNB have been found in greater numbers in Arizona by some researchers, with some roosts numbering up to 20,000 bats (USFWS 1995). Since the original listing, the total population of LLNB in Arizona has been estimated to swell to at least 80,000 adults and young in early summer, and surveys in Sonora and Baja, Mexico from 1989 to 1993 (and in other portions of mainland Mexico) indicate that the LLNB may be more common than originally thought. The USFWS completed a Recovery Plan for this species in 1995 that outlines five actions needed for recovery with the objective to reclassify the LLNB from endangered to threatened (USFWS 1995).

5.2.2.1. Data Source and Inventory Methods – Lesser long-nosed bat

WestLand conducted a literature review in order to obtain recent information about federal listing status, habitats and range of the LLNB. There is a substantial amount of information in the literature about the range and habits of LLNB, in particular Hoffmeister (1986), Flemming (1997), Cockrum (1991), and Cockrum and Petryszyn (1991).

During September 1996 and January-February 1997, Bat Conservation International (BCI) assisted BHP Copper, the owner of adjacent properties and current holder of mining claims covered by the Parcel, with LLNB survey of abandoned shafts and adits under BHP control. The purpose of the survey was to establish which features were potentially used by bats, and to then install bat-gates on those features with habitat potential. It is unclear which portions of the Parcel were covered by this survey. However, the reports contain a list of bat species

identified during the survey (Bat Conservation International 1996 and 1997). LLNB was not identified on this list of species. However, according to Cockrum (1991) by late September, all LLNB migrate to the south, to Mexico, and they may not have been in the area at the time of the bat survey.

Species-specific surveys were not conducted for LLNB as a part of this investigation. During the general field surveys, WestLand noted the distribution of potential forage species and other habitat elements (such as caves and adits) that might be utilized by LLNB. Other potentially suitable roost sites are present on the Parcel as well. All of these features are concentrated in the area on the west side of the Apache Leap escarpment. One adit, located on the west side of Apache Leap in Cross Canyon, had been bat-gated to prevent human access while allowing access for bats.

5.2.2.2. Potential for Occurrence – Lesser long-nosed bat

LLNB within the United States is found in desertscrub habitats and, in later parts of the summer, at higher elevation sites with suitable habitat. Key habitat elements for this species include columnar cacti and agave (providing the nectar and pollen that are the principal components of the LLNB diet) and the presence of suitable roost sites.

The following account of LLNB seasonal distribution is taken from Cockrum (1991). LLNB is a migratory species in Arizona. In April

and early May, gravid adult females enter Arizona and congregate in traditional maternity roosts. Figure 11 depicts this late spring/early summer range in Arizona. Adult males and some non-gravid females (apparently) remain in the more southern portions of their range in Mexico until mid- to late June. During early July, there appears to be an influx of adult males, adult females that have not borne young in the current year, and sub-adults of both sexes to higher elevations in southeastern Arizona. By mid-July, adult females and young of the year begin to join the transient colonies within the area identified as late summer range (Figure 12). Based upon the records reviewed by Cockrum (1991), most LLNB appear to have left Arizona and New Mexico by October. The early October observations of LLNB are from near or just south of the Mexico border.

The Parcel contains habitat elements, such as agave and potential roost sites, similar to those known to be used by LLNB. In general, outcrop features on the Parcel provide potential cave and crevice habitat for bats, and historic mining activities have created additional potential habitat in the form of shafts and adits. However, the Parcel is just outside the known, published range for this species.

The following table from Bat Conservation International (1997) summarizes the results of BCI's evaluation of approximately 350 underground mine workings in the vicinity of and on the Parcel. Information regarding the exact location of these features was not available to us.

Table 5-2. Bat Conservation International survey results.

Percentage	Potential for Bat Habitat	Examples
48%	Provided no habitat for bats.	Completely collapsed adits, shafts or declines; prospect diggings
31%	Marginal to no bat habitat, no sign of bat use.	Short adits (≤ 50 feet), shafts, or declines.
14%	Some bat sign evident, occasional use probable.	Deeper (>50 feet) adits, shafts, declines.
4.5%	Bats were present, frequent use probable.	Deeper and/or more complex adits and shafts.
2.5%	Bats were present, high probability of significant bat use.	More complex workings with inner-connecting adits, shafts, and/or declines; good airflow.

Figure 12 illustrates the known range for LLNB in Arizona, and Figure 13 depicts the locations of known roost sites for this species according to Flemming (1997) in *Lesser Long-Nosed Bat Recovery Plan*. There are no known occupied roost or maternity sites for this species on or near the Parcel. The nearest known maternity roosts are located approximately 145 kilometers (90 miles) south of the Parcel.

LLNB was provided on the list obtained from the Regional Forester as federally endangered and a WSCA. However, it is not listed as occurring within the Tonto Forest, and there is no species account of LLNB in *Tonto National Forest Threatened Endangered and Sensitive (TES) Species 2000 Draft Abstracts* obtained from the Regional Forester.

Based upon our literature review, the distribution of potential roost sites in relation to the Parcel, and published distribution records for this species, we do not believe that LLNB will occur on the Parcel. The marginal records of this species that have in part been used to define the northern edge of the late summer range (Cockrum and Petryszyn 1991 and Hoffmeister 1986) are for young of that year. Both the Phoenix and Glendale (30 August and 6 September, respectively; i.e., late summer) records are immature females. Moving to the

southeast, the next marginal record used to define range limits are at the south end of the Graham Mountains and from Muleshoe Preserve, approximately 129 and 64 kilometers (80 and 40 miles) southeast of the Parcel, respectively. While there are no data to rule out the possibility that LLNB could occasionally occur and forage on the Parcel, interpretation of the existing record would make this potential low.

While the Parcel is located just outside the published range boundaries and LLNB is considered very unlikely to occur, the Parcel and surrounding area contain agave and potentially suitable local and regional night roosts and day roosts. It is possible, therefore, that transient adults or juveniles could occur in this region in the late summer.

5.2.3. American Peregrine Falcon (*Falco peregrinus anatum*)

The American peregrine falcon is currently classified as Forest Sensitive and WSCA. This species was originally listed in 1970 as endangered under the Endangered Species Conservation Act of 1969. The final rule designating all free-flying peregrine falcons in the 48 conterminous United States as endangered under the ESA was published on

March 20, 1984 (USFWS 1999). Successful recovery of peregrine falcon populations in the United States warranted its removal from the list of federally endangered species and on August 25, 1999 all federal protection for this species was removed (USFWS 1999). At the time of delisting, 1,650 breeding pairs were known to occur in the United States and Canada, well above the overall recovery goal of 631 pairs. Recovery of the peregrine falcon is suspected to have occurred as a result of the ban on organochlorine-based pesticides, especially DDT, in the 1970s.

5.2.3.1. Data Source and Inventory Methods – American peregrine falcon

WestLand conducted a review of available literature to obtain the most recent information about federal listing status, habitat, range, and life history of the American peregrine falcon. Peregrine falcon habits are well documented in literature. This raptor is described on the list obtained from the Forest Service as a sensitive species (TNF 2000). Wildlife abstracts obtained from AGFD, USFWS, and TNF provide accounts of American peregrine falcon biology including status, known habitat and range. Glinski (1998) also provides current information regarding peregrine falcon habitat, distribution and life history in Arizona.

As part of this investigation, raptor surveys were accomplished using pedestrian transects, point counts, and cliff surveys during spring 2003. Transect lines were established to include representative samples of suitable raptor habitat found on the Parcel. Surveys were conducted from ½ hour before sunrise until four hours after sunrise. Observers used 10X binoculars to scan the area while noting any bird calling. Large trees, rock formations, and other potentially suitable nest areas were examined for whitewash and other evidence of raptor nests. Cliff surveys, with an emphasis on the western face of Apache Leap, were conducted for peregrine falcon. The cliff faces were

systematically scanned with a spotting scope and binoculars for evidence of whitewash, stick nests and raptors. Static observation points were established at several locations along the base of Apache Leap. At each point, cliffs were scanned in overlapping visual cones. Areas where micro-orientation of the rock placements resulted in mitigation (shading) of extreme sun exposure were noted and carefully observed.

The location of any raptors or raptor sign identified during field surveys on the Parcel was recorded and mapped (Figure 9).

5.2.3.2. Potential for Occurrence – American peregrine falcon

Peregrine falcons occur worldwide and are represented in North America by three subspecies. *Falco p. anatum*, the subspecies that occurs in Arizona, occurs as far north as the Yukon River in Alaska and as far south as Baja California, Sonora, and the highlands of central Mexico (Glinski 1998, AGFD 2003). In the southwestern United States, peregrine falcons occur in areas with mountain cliffs and river gorges and sometimes within urban landscapes on building ledges, transmission towers, and other tall structures (Glinski 1998). Eyries, which are occupied during the breeding season between March and August, are usually at least 100 to 200 feet high on open ledges where prey is abundant (TNF 2000). Dominant geological features in northern and central Arizona such as the Mogollon Rim, Grand Canyon, and Colorado River Plateau provide suitable habitat and forage for peregrine falcons. Peregrine falcons are known to utilize a wide variety of habitats for foraging, including Sonoran, Mohave, and Great Basin Desertscrub up through areas of Rocky Mountain and Madrean Montane Conifer and Ponderosa Pine Forest (AGFD 2003). American peregrine falcons prey almost exclusively on bats and birds such as blackbirds, doves, jays, and other small songbirds.

In Arizona, there are over 200 known eyries, and breeding pairs are well distributed in suitable habitat (USFWS 2001). The recovery objective for Arizona is 46 breeding pairs, which comprises approximately 25 percent of the Rocky Mountain/Southwest recovery objective (64 FR 64542, August 1999). The number of breeding pairs currently in Arizona exceeds the entire recovery objective for the Rocky Mountain/Southwest population that included Colorado, Idaho, Montana, Nebraska, New Mexico, North Dakota, South Dakota, Texas, Utah, and Wyoming. Extensive surveys by the AGFD over the last 10 to 15 years have identified suitable habitat for American peregrine falcons on the TNF in the Sierra Ancha Mountains and confirmed peregrine falcons on the TNF along the Mogollon Rim, in the Sierra Anchas, and the Mazatzal Mountains (TNF 2000).

The Parcel, particularly on the west face of the Apache Leap escarpment, provides suitable habitat for peregrine falcon. High cliffs, canyon walls, and pinnacles are located on both sides of Apache Leap and provide falcons with opportunities for hunting, perching, and nesting. The craggy, competent walls of the Apache Leap escarpment provide stable, shaded areas and protected recesses that are highly suitable for nest sites. The diverse vegetation structure that occurs on the bajada fan along the base of Apache Leap provides a diverse open habitat that supports a sufficient prey base for the falcon.

As described in Section 3 of this report, the vegetation and habitat on the west side of Apache Leap is representative of the Arizona Upland subdivision of the Sonoran Desertscrub biotic community (Brown 1994), which includes many flowering shrubs and forbs that attract and sustain a suitable prey base for falcons. In addition, a reliable source of water, Arnett Creek, is located about 6,000 meters (3.5 miles) west of the Apache Leap.

East of the Apache Leap escarpment, the vegetation transitions into the Interior chaparral biotic community that includes plant species such as scrub oak and manzanita, with only a few tall trees. In this area, the tuff formation outcrops as large boulders, some of which have weathered into spires. Peregrine falcons may use this area for foraging, but it is more likely that they would hunt off of the cliff face to the west.

During raptor surveys, one nesting pair of peregrine falcons was observed on the west face of Apache Leap. The general location of the nest was noted. Adult falcons were observed hunting for prey along the cliff face in the early morning hours. The presence of a nest was detected by the aural feeding response of chicks when the adults disappeared from sight and returned to the nest. Although the nest was not directly observed, the vigorous vocal response from the young echoed from the cliff walls and was easily distinguished. During additional raptor transect survey along the top of Apache Leap, nestlings were again identified aurally in the same general location and are assumed to represent the young from the same nest previously detected.

5.2.4. Sonoran Desert Tortoise (*Gopherus agassizii*)

The Sonoran desert tortoise is classified as Forest Sensitive and WSCA. It is not listed or proposed for listing by USFWS as endangered or threatened. This species ranges from northern Sonora Mexico to southern Nevada and southwestern Utah, and from south central California east to southeastern Arizona (AGFD 2003). Two distinct populations are recognized for the purposes of the ESA: the threatened Mojave population occurs north and west of the Colorado River, and the Sonoran population occurs south and east of the Colorado River (USFWS 1990 and 1996).

5.2.4.1. Data Sources and Inventory Methods – Sonoran desert tortoise

WestLand conducted a review of available literature to obtain the most recent information about preferred habitat, life history and known range of Sonoran desert tortoise in Arizona. Wildlife abstracts obtained from the HDMS, BISON, and TNF provide accounts of Sonoran desert tortoise biology including known habitat and range.

No species-specific surveys were conducted for Sonoran desert tortoise. However, during general biological investigation work on the Parcel, WestLand biologists searched for potential habitat that could be utilized by this species. General biological surveys typically consisted of walking transects that cover a wide area through a variety of habitat types and geologic features which potentially provide habitat and cover for reptiles. Surveyors conducted pedestrian transects that were generally identified during a pre-trip planning session. The survey routes meandered through the Parcel to encompass the full range of habitats found and were adjusted in the field as necessary due to limitations imposed by the terrain. Transects typically followed pre-established trails, roads, and drainages, which provided access to, and opportunity for observation of, all of the habitat types on the Parcel.

5.2.4.2. Potential for Occurrence – Sonoran desert tortoise

Within Arizona, Sonoran desert tortoises occur throughout much of the central and southwestern portion of the state. The northeastern-most population occurs along the Salt River in Gila County, while the eastern-most occurrences are along the middle San Pedro River drainage in Cochise County. Tortoises have been located as far southwest as the Yuma Proving Ground, Barry M. Goldwater Range, and the Cabeza Prieta National Wildlife

Refuge (AGFD 2003). Populations of Sonoran desert tortoise are known to exist on TNF, and the AGFD indicates their presence within three miles of the Parcel (Correspondence from AGFD 2003; Appendix B).

Habitat for Sonoran desert tortoise includes rocky slopes and bajadas in Mohave and Sonoran Desertscrub, including a variety of biotic communities within or extending from the Sonoran Desert but most often in palo verde-mixed cacti associations (AGFD 2003). Tortoise are found in Arizona upland and Lower Colorado River subdivision of the Sonoran Desert, desert grassland, and ecotonal areas consisting of Sonoran Desertscrub with elements of Mojave Desertscrub and juniper woodland, interior chaparral, and desert grassland (Averill-Murray and Klug 2000). The Sonoran population of desert tortoise occurs at elevations from about 155 m to 1,615 m (500 to 5,300 ft).

Within the Parcel, the vegetation community is suitable for Sonoran desert tortoise and, in particular, the presence of a gently sloping bajada fan with a western aspect west of the Apache Leap escarpment is noted as potential habitat. This fan area covers approximately 162 hectares (400 acres) of the Parcel. Although no specimens were observed during field surveys, Sonoran desert tortoise is considered likely to occur on the Parcel west of Apache Leap.

5.2.5. Arizona Night Lizard (*Xantusia vigilis arizonae*)

The Arizona night lizard is classified as Forest Sensitive.

5.2.5.1. Data Source and Inventory Methods – Arizona night lizard

WestLand conducted a review of available literature to obtain the most recent information about Arizona night lizard's preferred habitat, life history and known range in Arizona. This reptile is described on the list obtained from Forest

Service as a Forest Sensitive species (TNF 2000). Wildlife abstracts obtained from BISON (2003) as well as TNF provide accounts of Arizona night lizard biology, including known habitat and range.

General biological surveys for reptile species, including Arizona night lizard, and their habitats, were conducted as part of the baseline investigation. These surveys were accomplished by walking transects that cover a wide area through a variety of habitat types and geologic features which could provide habitat and cover for reptiles and their prey species. Surveyors conducted pedestrian transects that were generally identified during a pre-trip planning session. The survey routes meandered throughout the Parcel to encompass the full range of habitats found and were adjusted in the field as necessary due to limitations imposed by the terrain. Transects typically followed pre-established trails, roads, and drainages, which provided access to, and the opportunity for observation of, all of the habitat types on the Parcel. Nighttime observation of roadways supplemented walking transects and observations made during other biological survey. Rocks and logs that indicated potential habitat were occasionally turned over to observe for the presence of reptiles.

5.2.5.2. Potential for Occurrence – Arizona night lizard

The limited information available indicates that this species occurs locally along the Colorado Plateau. The Bureau of Land Management conducted a herpetological survey which documented an extension of the range for Arizona night lizard from the Hualapai Mountains southeast to the vicinity of Superior and Globe/Miami. This species is listed as occurring on TNF (2000).

The Arizona night lizard is found in pinyon-juniper woodland, closed and open oak-chaparral in central Arizona, juniper woodland

(mixed shrub), and Mojave Desertscrub habitat types primarily along the edge of the Colorado Plateau. This secretive, diurnal lizard hides under rocks, in rock crevices, under cow scats, in soil-matted dead brush, beneath logs, and under other dead vegetation (Stebbins 2003). Because of their secretive nature, night lizards (in general, not just var. *arizonae*) were at one time considered extremely rare, but are now known to be one of the most abundant lizards in the United States (Stebbins 2003).

The chaparral vegetation assemblage most common on the Parcel is oak-manzanita, which corresponds to published descriptions of potential habitat for Arizona night lizard. This community is present on about 75 percent of the Parcel east of Apache Leap. Large amounts of exposed bedrock with varying degrees of weathering and fracturing represent excellent lizard habitat within these areas.

Although no specimens were observed during field surveys, suitable habitat exists for Arizona night lizards and individuals may be present east of Apache Leap. Considering the common and widespread abundance of this species' habitat in Arizona and the recent range extension in Arizona after BLM survey, there is no reason to suspect that the Arizona night lizard would not be common within suitable habitat on the Parcel (i.e., east of Apache Leap).

5.2.6. Lowland Leopard Frog (*Rana yavapaiensis*)

The Lowland leopard frog is classified as Forest Sensitive and WSCA.

5.2.6.1. Data Sources and Inventory Methods – Lowland leopard frog

WestLand conducted a review of available literature to obtain the most recent information about the Lowland leopard frog's preferred habitat, life history and known range in Arizona.

This frog is described on the list obtained from Forest Service as a sensitive species (TNF 2000). Species descriptions obtained from TNF provide accounts of Lowland leopard frog biology, including known habitat and range.

Surveys for Lowland leopard frog within the Parcel followed the General Visual Encounter Survey Method (VEM) protocol developed by the USFWS (USFWS 2003b). The Chiricahua leopard frog VEM Form was used in collecting locality data, site and visit conditions, and herpetofauna observations for all potentially suitable surface water features on the Resolution site. Features that were clearly too small or otherwise deemed unsuitable were noted in field notes, and data collection forms were not filled out for these features. Focused field surveys for amphibians were scheduled and conducted to coincide with the active season for *Ranid* frogs and were conducted between April 16th and June 10th, 2003 when water temperatures reached 14°C or above (per protocol).

Focused *Ranid* surveys within the Parcel were conducted along portions of Queen Creek, tributaries to Queen Creek, and the reservoirs and stock tanks that occur on the parcel (Figure 7). Surveys were conducted on April 16, May 14, 15, and 16; May 30 and 31; and June 9 and 10, 2003.

5.2.6.2. Potential for Occurrence – Lowland leopard frog

Lowland leopard frogs are habitat generalists inhabiting and breeding in a variety of natural and man-made aquatic systems located in habitat ranging from desert grasslands to pinyon-juniper between 244 and 1,678 m (800 and 5,500 ft) (AGFD 2003). They prefer natural river systems, permanent streams, and permanent pools in intermittent streams, springs, and cieniegas; however, they can be found in stock ponds, irrigation canals, backyard ponds and other similar water features

throughout their range (AGFD 2003). The presence of emergent vegetation is an important habitat feature that provides basking habitat, refuge, and forage opportunities for this species. Associated vegetation includes the Arizona sycamore (*Platanus wrightii*), seep-willow (*Baccharis glutinosa*), other trees and shrubs, and various forbs and graminoid plants (BISON 2003).

Queen Creek in the northern portion of the site is an intermittent stream while all other drainages on the Parcel are ephemeral. Water levels in reservoirs, ponds, and stock tanks on the Parcel are variable, but only one (the Oak Flat Reservoir) is anticipated to hold water year-round. Additional information and descriptions of water features on the Parcel can be found in Section 3.2.3.2 of this report.

At the time of field reconnaissance (mid to late spring), the drainages within the Parcel contained only sporadic pools of surface water within tinajas or plunge kettles. The stock tanks and small tinajas that maintained surface water through June were the only features where amphibians were observed. Canyon tree frogs (larvae and adults) and a red Spotted toad were noted within only one ephemeral drainage on the property (Drainage L; Figure 7). While no amphibians were noted within the portions of Queen Creek on the Parcel, tadpoles were noted within Queen Creek just west of the Parcel boundary. It is expected that amphibians occur within all stretches of Queen Creek when there is sufficient surface water or moisture present. Tiger salamander larvae were also noted within the northernmost stock tanks along the Drill Road just south of Magma Mine Road and within the reservoir adjacent to Magma Mine Road within the Parcel. Different larval stages of the salamander were noted on April 16, May 15 and 16, and May 30.

Lowland leopard frogs were not detected during focused survey, and habitats on the Parcel would be considered marginal for this species.

While Lowland leopard frog may occur in intermittent water sources that may periodically dry up, the most reliable sources of water on the property, the Reservoir and Stock Tanks, do not contain suitable vegetation cover along the margins and thus do not appear to provide suitably diverse habitat to meet the various habitat requirements of this species. Based upon the species-specific surveys that have been conducted to date and the current condition of aquatic habitats within the parcel, we do not expect Lowland leopard frog to occur on the property.

5.2.7. Gila Monster (*Heloderma suspectum*)

The Gila monster is classified as Forest Sensitive.

5.2.7.1. Data Source and Inventory Methods – Gila monster

WestLand conducted a review of available literature to obtain the most recent information about the Gila monster's preferred habitat, life history and known range in Arizona. Species descriptions obtained from TNF (2000) and Stebbins (2003) provide accounts of Gila monster biology, including known habitat and range.

General biological surveys for reptile species (including Gila monster) and their habitats were conducted in conjunction with biological and resource surveys as part of the baseline investigation. These surveys were accomplished by walking transects that cover a wide area through a variety of habitat types and geologic features which could provide habitat and cover for reptiles and their prey species. Surveyors conducted pedestrian transects that were generally identified during a pre-trip planning session. The survey routes meandered throughout the Parcel to encompass the full range of habitats found and were adjusted in the field as necessary due to

limitations imposed by the terrain. Transects typically followed pre-established trails, roads, and drainages, which provided access to, and the opportunity for observation of, all of the habitat types on the Parcel. Nighttime observation of roadways supplemented walking transects and observations made during other biological survey. Rocks and logs that indicated potential habitat were occasionally turned over to observe for presence of reptiles during the surveys.

5.2.7.2. Potential for Occurrence – Gila monster

The Gila monster is found primarily in the Sonoran desert and extreme western edge of the Mohave Desert, less frequently in desert grassland, and rarely in oak woodland. The species prefers wet, rocky palo verde-saguaro desertscrub foothills, bajadas, and canyon bottoms over more arid areas on sandy dry flats. They are typically found near washes and intermittent streams where they have access to water and damp soil (Stebbins 2003).

As described in Section 3 of this report, vegetation occurring on the majority of the Parcel is generally classified as belonging to two major biotic communities: Interior chaparral (on about the eastern 80 percent of the Parcel) and the Arizona Upland subdivision of Sonoran Desertscrub (on about the western 20 percent of the Parcel) (Brown 1994). Both of these communities are drier upland types and dissimilar to preferred habitat for Gila monster. However, some xeroriparian habitat occurs in association with stock tanks, tinajas, and ephemeral drainages. Steeply sloping terrain and narrow, boulder-filled canyons result in some areas of shade and moisture. In addition, a small, intermittent section of Queen Creek cuts across the northwest corner of the Parcel, and a few sycamore and Arizona walnut trees occur along this stretch. These riparian zones are somewhat similar to those described as preferable for this species. More suitable habitat

is available adjacent to the Parcel in Devils Canyon (approximately one-half mile east), where several Gila monsters were observed during 2002 and 2003 fieldwork. Although no specimens were observed on the Parcel during field surveys, the Gila monster may occur on the Parcel, perhaps in association with Queen Creek.

5.2.8. Common Blackhawk (*Buteogallus anthracinus*)

The common blackhawk is classified as Forest Sensitive, WSCA, and a Management Indicator Species (MIS) in Tonto National Forest because of its preference for riparian corridor habitat (TNF 2000).

5.2.8.1. Data Source and Inventory Methods – Common blackhawk

WestLand conducted a review of available literature to obtain the most recent information about the common blackhawk's preferred habitat, life history and known range in Arizona. Wildlife abstracts obtained from BISON (2003) and TNF (2000) provide accounts of common blackhawk biology, including status, known habitat and range.

As part of this investigation, raptor surveys were accomplished using pedestrian transects, point counts, and cliff surveys during spring 2003. Transect lines were established to include representative samples of the common blackhawk's habitat found on the Parcel. Surveys were conducted from ½ hour before sunrise until four hours after sunrise. Observers used 10X binoculars to scan the area while noting any bird calling. Large trees, rock formations, and other potentially suitable nest areas were examined for whitewash and other evidence of raptor nests. Cliff surveys, with an emphasis on the western face of Apache Leap, were conducted. The cliff faces were systematically scanned with a spotting scope and binoculars for evidence of whitewash, stick

nests, and raptors. Static observation points were established at several locations along the base of Apache Leap. At each point, cliffs were scanned in overlapping visual cones. Areas where micro-orientation of the rock placements resulted in mitigation (shading) of extreme sun exposure were noted and carefully observed.

The location of any raptors or raptor sign identified during field surveys on the Parcel was recorded and mapped (Figure 9).

5.2.8.2. Potential for Occurrence – Common blackhawk

Common blackhawks are summer residents of Arizona and are known to nest along remote streams draining the Mogollon Rim in central Arizona, the Big Sandy River, and Virgin River Basin in northwestern Arizona, and the upper Gila River basin in eastern Arizona (BISON 2003). Habitat for this species is found below the ponderosa pine and mixed-conifer zones, in the lower elevation riparian zones containing cottonwood and sycamore. This hawk is dependent upon mature, relatively undisturbed habitat supported by permanently flowing streams. Tall trees must be present along the stream course for nesting, and groves are preferred over single trees. Common blackhawks are "still-hunters", hunting from tree and cliff perches. In addition, they often wade into water and pursue prey afoot. Shallow streams of low to moderate gradient provide ideal hunting conditions, and food items include crayfish, amphibians, reptiles, and fish (BISON 2003).

Generally, the habitat within the Parcel is dissimilar to the published descriptions of preferred habitat for Common blackhawk. As noted above, the Common blackhawk is described as primarily a riparian species with preferences for tall trees and flowing water. The Parcel, by contrast, is characterized by dry uplands with interior chaparral vegetation and little perennial water. There are a few tall trees

associated with surface water features but no reliable sources of water, with the exception of the Oak Flat Reservoir. Some potentially suitable habitat exists in nearby Devils Canyon (one-half mile to the east), and a transient bird may have been observed on the Parcel. The possible sighting occurred in the area where a confirmed sighting of a Zone-tailed hawk (*Buteo albonotatus*) had also occurred. Because the species have similar markings and the possible blackhawk was only observed in the perching position, the sighting remains in question. Common blackhawk individuals were observed in Devils Canyon (outside the Parcel) on two separate occasions in June 2003; behaviors were noted during these observations.

5.2.9. Allen's Big-eared Bat (*Idionycteris phyllotis*)

Allen's big-eared bat is listed as a Forest Sensitive species. This species was listed by the USFWS as a Category 2 Candidate species in 1994, but subsequent changes to the candidate listing protocol removed it from candidate consideration in 1996 (BISON 2003). Because this species is not listed or proposed for listing by the USFWS as endangered or threatened, critical habitat has not been designated for this species in Arizona.

5.2.9.1. Data Source and Inventory Methods – Allen's big-eared bat

WestLand conducted a review of available literature to obtain the most recent information about Allen's big-eared bat's preferred habitat, life history and known range in Arizona. Information related to this species is relatively limited. Accounts of the known range and habitat of Allen's big-eared bat were obtained from wildlife abstracts provided by the AGFD (2001) and TNF (2000).

During September 1996 and January-February 1997, BCI assisted BHP Copper, the owner of adjacent properties and current holder of mining

claims covered by the Parcel, with surveying most all of the abandoned shafts and adits under BHP control. The purpose of the survey was to establish which features were potentially used by bats, and to then install bat-gates on those features with habitat potential. It is unclear what portions of the Parcel were covered by this survey. However, the reports contain a list of bat species identified during the survey (Bat Conservation International 1996 and 1997). Allen's big-eared bat was not identified on this list of species.

No species-specific surveys were conducted for Allen's big-eared bat as a part of this investigation. During the general biological field surveys, WestLand biologists noted the distribution of potential forage areas as well as other habitat elements such as caves and adits that might be utilized by Allen's big-eared bat. Most mine features within the analysis area are shallow excavations that have been backfilled or remain as shallow pits with large openings and do not provide suitable roost habitat. Numerous potentially suitable roost sites exist throughout the Parcel but are concentrated in the area on the west side of the Apache Leap escarpment. One adit, located on the west side of Apache Leap in Cross Canyon, was bat-gated to prevent human access while allowing access for bats.

In Arizona all bat species are protected through Commission Order 14, and cannot be collected with a hunting license or possessed without a permit issued pursuant to Article 4 (Live Wildlife Rules). WestLand did not attempt to enter potential bat roosts or capture live bats.

5.2.9.2. Potential for Occurrence – Allen's big-eared bat

In Arizona, Allen's big-eared bat have typically been found in association with ponderosa pine, pinyon juniper, Mexican woodland, and riparian habitat with sycamores, cottonwoods, and willows at elevations from 403 m to 3,225 m (1,320 to 9,800 ft) (Hoffmeister 1986). These

bats have been found as high as white fir habitats and as low as Mohave Desertscrub. In the eastern half of the state, Allen's big-eared bat is associated with conifers and, frequently, with rocky slopes and cliffs near potential roost sites. Where bats have been observed at lower elevations, the presence of water may be a more important factor than other habitat preferences.

Other important habitat features for Allen's big-eared bat include boulder piles, rock outcrops, cliffs, and lava flows. This insect-eating bat feeds mainly upon soft-bodied flying insects such as moths and may forage over a variety of habitat types, particularly water (AGFD 2001). As such, this species is most often associated with permanent water sources. Most observations of this species occur two to three hours after sunset, over water.

Allen's big-eared bat utilizes a variety of habitat types for roosting including caves, adits and other mine workings. They have also been observed to roost in trees on the Coconino and Apache-Sitgreaves National Forests (AGFD 2001 and 1996).

The relatively large range of Allen's big-eared bat extends throughout the mountainous regions in the southwestern United States and central Mexico. Hoffmeister (1986) provides a range map and accounts of Allen's big-eared bat detections in Arizona, scattered in a band from the northwestern part of the state to the southeastern corner. Although review of available literature indicates no detections of Allen's big-eared bat within the Parcel (Hoffmeister 1986), the parcel does lie within this species' known range. The TNF abstracts (2000) indicate that the closest occurrences of Allen's big-eared bat have been documented in the Sierra Anchas on the Tonto Basin Ranger District in 1992 and 1997. In addition, one Allen's big-eared bat was captured on the Pleasant Valley Ranger District in the same mountain range in 1993. Other known

occurrences in Arizona have been documented in Yavapai, Mohave, Coconino, and Cochise counties (Hoffmeister 1986).

Although the dominant chaparral vegetation communities within the Parcel have not been documented to support Allen's big-eared bat, the project area supports other habitat elements and potential roost sites similar to those known to be used by the species. In general, outcrop features on the Parcel provide potential cave and crevice habitat for bats, and historic mining activities have created additional potential roost habitat in the form of shafts and adits. Table 5-2, above, summarizes the results of BCI's evaluation of approximately 350 underground mine workings in the vicinity of and on the Parcel. Most of these mine features are shallow excavations in hillsides that have been backfilled, or remain as shallow open pits with large openings and would not provide suitable habitat for Allen's big-eared bat. One adit, located on the west side of Apache Leap in Cross Canyon, is bat-gated to prevent human access while allowing bat entry.

Onsite surface water features (including stock tanks, tinajas, and reservoirs) are found within the project area but perhaps only one (the Oak Flat Reservoir) contains perennial water. The Parcel, therefore, would not be expected to support Allen's big-eared bat year-round.

Based upon our literature review, the distribution of potential roost sites, and published distribution records for this species, we believe that the Allen's big-eared bat has the potential to occur within the Parcel. Although life history information for this species is limited, the Parcel occurs within the species' known range and supports potentially suitable, though marginal, habitat.

5.2.10. California Leaf-nosed Bat (*Macrotus californicus*)

In Arizona, the California leaf-nosed bat is classified as WSCA and a Forest Sensitive species. This species was listed as a Category 2 Candidate species in 1994, but subsequent changes to the candidate listing protocol removed it from candidate consideration in 1996 (BISON 2003). Because this species is not listed or proposed for listing by the USFWS as endangered or threatened, critical habitat has not been designated for this species in Arizona.

5.2.10.1. Data Source and Inventory Methods – California leaf-nosed bat

WestLand conducted a review of available literature in order to obtain the most recent information about the California leaf-nosed bat's preferred habitat, life history and known range in Arizona. Wildlife abstracts obtained from the AGFD (2003) and TNF (2000) provide accounts of this species' biology, including known habitat and range. Hoffmeister (1986) provides a range map and accounts of California leaf-nosed bat detections throughout Arizona.

During September 1996 and January-February 1997, Bat Conservation International (BCI) assisted BHP Copper, the owner of adjacent properties and current holder of mining claims covered by the Parcel, with surveying most all of the abandoned shafts and adits under BHP control. The purpose of the survey was to establish which features were potentially used by bats, and to then install bat-gates on those features with habitat potential. It is unclear what portions of the Parcel were covered by this survey. However, the reports contain a list of bat species identified during the survey (Bat Conservation International 1996 and 1997). Although California leaf-nosed bat was not identified during the BCI surveys, the reports noted that the BCI analysis area contains habitat suitable for this species.

No species-specific surveys were conducted for California leaf-nosed bat as part of this investigation. During the general biological field surveys, WestLand biologists noted the distribution of potential habitat elements such as caves and adits that might be utilized by California leaf-nosed bat. Most mine features within the analysis area are shallow excavations that have been backfilled or remain as shallow pits with large openings and do not provide suitable roost habitat. Some potentially suitable roost sites exist throughout the Parcel, but are concentrated in the area on the west side of the Apache Leap escarpment. One adit, located on the west side of Apache Leap in Cross Canyon, was bat-gated to prevent human access while allowing access for bats.

In Arizona all bat species are protected through Commission Order 14, and cannot be collected with a hunting license or possessed without a permit issued pursuant to Article 4 (Live Wildlife Rules). WestLand did not attempt to enter potential bat roosts or capture live bats.

5.2.10.2. Potential for Occurrence – California leaf-nosed bat

The known range of the California leaf-nosed bat extends from Arizona west to California, south to the southern tip of Baja California, and into northern Sinaloa and southwestern Chihuahua, Mexico. In Arizona, most records for this species have been reported south of the Colorado Plateau along the Mogollon Rim, and in the southwestern deserts of the state. A bat colony containing California leaf-nosed bat was reported in 1916 in the Mazatzal Mountains within the Tonto Basin Ranger District (TNF 2000). Two additional mines supporting this species were identified in 1960 within the same mountain range. A California leaf-nosed bat colony near Seven Mile Wash in the Globe Ranger District was extant as of 1986 (TNF 2000).

This bat lives predominantly in Sonoran Desertscrub habitat, roosting in mines, caves, and rock shelters, but occasionally is found Mohave, Chihuahuan, and Great Basin deserts (AGFD 2003). The primary summer and winter ranges of this species are essentially the same, and the species is not known to migrate or hibernate within Arizona. During the day, California leaf-nosed bat roosts primarily in mines and caves, typically within 24 m (80 ft) of the entrance. At night it may rest in abandoned buildings, under bridges, porches, and in mines that provide protection, but are open for direct flight. This species is temperature sensitive and will seek roost sites in the winter where temperatures are above 24° C (75° F). Based on records in the HDMS, elevation for this species ranges from 49 m to 1,214 m (160 to 3,980 ft), with most records below 762 m (2,500 ft) (AGFD 2003).

The California leaf-nosed bat feeds primarily on large, flying insects such as grasshoppers, moths, and flying beetles, with diurnal insects being particularly important in winter months. Prey is typically taken while the bat is hovering close to the ground or by gleaning from vegetation, often within 1 m (3 ft) of the ground, although this species is also capable of taking prey in flight. Hoffmeister (1986) reports that this species may also feed on fruits such as that of cactus species. Foraging periods for this species are typically one to three hours after sunset, with another two-hour period ending approximately one-half hour before sunrise.

As described in Section 3 of this report, that portion of the Parcel west of the Apache Leap escarpment is characterized by Sonoran Desertscrub vegetation. In addition, the Apache Leap cliff face and rock formations provide an abundance of crevices and cliff face habitat, and nearby mining districts provide a variety of suitable roosting sites. The California leaf-nosed bat is known to occur on the TNF and may occur on or near the Parcel.

5.2.11. Spotted Bat (*Euderma maculatum*)

In Arizona, the spotted bat is classified as a WSCA and a Forest Sensitive species. This species was listed by the USFWS as a Category 2 Candidate species in 1994, but subsequent changes to the candidate listing protocol removed it from candidate consideration in 1996 (BISON 2003). Because this species is not listed or proposed for listing by the USFWS as endangered or threatened, critical habitat has not been designated for this species in Arizona.

5.2.11.1. Data Source and Inventory Methods – Spotted bat

WestLand conducted a review of available literature in order to obtain the most recent information about the spotted bat's preferred habitat, life history and known range in Arizona. Information related to this species in Arizona is relatively limited. Wildlife abstracts obtained from the AGFD (2003) and TNF (2000) provide accounts of spotted bat biology, including known habitat and range. Hoffmeister (1986) provides a range map and accounts of spotted bat detections in central and western Arizona.

During September 1996 and January-February 1997, BCI assisted BHP Copper, the owner of adjacent properties and current holder of mining claims covered by the Parcel, with surveying most all of the abandoned shafts and adits under BHP control. The purpose of the survey was to establish which features were potentially used by bats, and to then install bat-gates on those features with habitat potential. It is unclear what portions of the Parcel were covered by this survey. However, the report contains a list of bat species identified during the survey (Bat Conservation International 1996 and 1997). The spotted bat was not identified on this list of species.

No species-specific surveys were conducted for spotted bats as part of this investigation. During the field surveys, WestLand biologists noted the distribution of potential habitat elements such as caves and adits that might be utilized by this species. Numerous potentially suitable roost sites exist throughout the Parcel, but are concentrated in the area on the west side of the Apache Leap escarpment. One adit, located on the west side of Apache Leap in Cross Canyon, was bat-gated to prevent human access while allowing access for bats.

In Arizona, all bat species are protected through Commission Order 14, and cannot be collected with a hunting license or possessed without a permit issued pursuant to Article 4 (Live Wildlife Rules). WestLand did not attempt to enter potential bat roosts or capture live bats.

5.2.11.2. Potential for Occurrence – Spotted bat

The spotted bat has a large geographic range throughout central western North America, from southern British Columbia and Montana, south through California and Big Bend, Texas, to Durango and Queretaro, Mexico. The species range in Arizona is poorly defined, with individuals identified in Yuma and Maricopa Counties and along the Arizona-Utah border (AGFD 2003). Although the TNF does not list the species as occurring within the Forest, species account is provided in the *Tonto National Forest Threatened Endangered and Sensitive (TES) Species 2000 Draft Abstracts* obtained from the Regional Forester (TNF 2000).

Spotted bats have been found in a variety of biotic communities, including desertscrub communities of all four North American deserts (Sonoran, Chihuahuan, Mohavean, and Great Basin) and in riparian, pinyon-juniper and mountain forests (AGFD 2003). In Arizona, spotted bats have been encountered in a variety of habitats from low desert areas in

southwestern Arizona to high desert and riparian habitat in the northwestern part of the state, and conifer forest in the north. The species occurs at elevations ranging from 34 m to 2,644 m (110-8,670 ft) (AGFD 2003). Distribution of this bat is highly correlated with the availability of caves and mines that provide suitable roosting habitat. Roost site characteristics for this species are also not well described, though they are typically found in association with crevices and cracks in rocky cliffs near surface water (TNF 2000). Limited evidence suggests that the primary food source of this species is moths, with June beetles and grasshoppers occasionally being taken on the ground (AGFD 2003).

As described in Section 3 of this report, that portion of the Parcel west of the Apache Leap escarpment is characterized by Sonoran Desertscrub vegetation. In addition, the Apache Leap cliff face and rock formations provide an abundance of crevices and cliff face habitat, and nearby mining districts provide a variety of suitable roosting sites. Permanent water sources within and near the Parcel are potentially available within one of the stock tanks east of the Apache Leap escarpment.

Based upon our literature review, the distribution of potential roost sites, and published distribution records for this species, we believe that the spotted bat has a relatively low potential to occur within the Parcel. The species is primarily known from western Arizona and appears to require significant surface water resources.

5.2.12. Townsend's Big-eared Bat (*Corynorhinus townsendii*)

Townsend's big-eared bat is listed as a Forest Sensitive species. Because this bat is not listed or proposed for listing by the USFWS as endangered or threatened, critical habitat has not been designated for this species in Arizona.

5.2.12.1. Data Source and Inventory Methods – Townsend's big-eared bat

WestLand conducted a review of available literature in order to obtain the most recent information about the preferred habitat of the Townsend's big-eared bat, life history, and known range in Arizona. Wildlife abstracts obtained from the TNF (2000) and BISON (2003) provide accounts of Townsend's big-eared bat biology, including known habitat and range. Hoffmeister (1986) provides a range map and accounts of Townsend's big-eared bat detections in Arizona.

During September 1996 and January-February 1997, BCI assisted BHP Copper, the owner of adjacent properties and current holder of mining claims covered by the Parcel, with surveying most all of the abandoned shafts and adits under BHP control. The purpose of the survey was to establish which features were potentially used by bats, and to then install bat-gates on those features with habitat potential. It is unclear what portions of the Parcel were covered by this survey. However, the reports contain a list of bat species identified during the survey (Bat Conservation International 1996 and 1997). The Townsend's big-eared bat was not identified on this list of species.

No species-specific surveys were conducted for Townsend's big-eared bat as part of this investigation. During the field surveys, WestLand biologists noted the distribution of potential habitat elements such as caves and adits that might be utilized by this species. Most mine features within the analysis area are shallow excavations that have been backfilled or remain as shallow pits with large openings and do not provide suitable roost habitat. Other potentially suitable roost sites exist throughout the Parcel, but are concentrated in the area on the west side of the Apache Leap escarpment. One adit, located on the west side of Apache Leap in Cross Canyon, was bat-gated to prevent human access while allowing access for bats.

In Arizona all bat species are protected through Commission Order 14, and cannot be collected with a hunting license or possessed without a permit issued pursuant to Article 4 (Live Wildlife Rules). WestLand did not attempt to enter potential bat roosts or capture live bats.

5.2.12.2. Potential for Occurrence – Townsend's big-eared bat

This bat species is wide-ranging in western North America from Washington to South Dakota, Texas, California, Arizona, and through southern Mexico. Several isolated populations also exist in the central United States. In Arizona, roost sites have been reported throughout the state including on the TNF, in the Sierra Anchas on the Tonto Basin and Pleasant Valley Ranger Districts, in the Mazatzal Mountains on the Payson Ranger District, and in the Bill Williams River area (TNF 2000). Maps of this bat's distribution in Arizona indicate that it occurs generally throughout the entire state (Hoffmeister 1986).

Townsend's big-eared bat occurs in a variety of habitats including desertscrub, sagebrush, chaparral, and deciduous and coniferous forests. In Arizona, this species occurs throughout the state, although it is only infrequently found in desert mountains (TNF 2000). The species requires caves or abandoned mines for day roosts and hibernation and will also use abandoned buildings and bridges, and crevices on rock cliffs for refuge. Townsend's big-eared bat does not move far from summer roosts and does not range far from the day roost to forage (BISON 2003). Concentrations of this species occur in areas with substantial surface exposures of cavity-forming rock and in old mining districts. The reported elevation range for Townsend's big-eared bat is 365 m to 1,706 m (1,200-5,600 ft).

As described in Section 3 of this report, that portion of the Parcel west of the Apache Leap escarpment is characterized by Sonoran Desertscrub vegetation. In addition, mine

workings, the Apache Leap cliff face, and other rock formations throughout the Parcel provide suitable roosting sites for this species. Given the wide variety of habitat types reported for Townsend's big-eared bat, as well as its broad

range, this species may occur within the Parcel or may fly over the area during foraging and dispersal.

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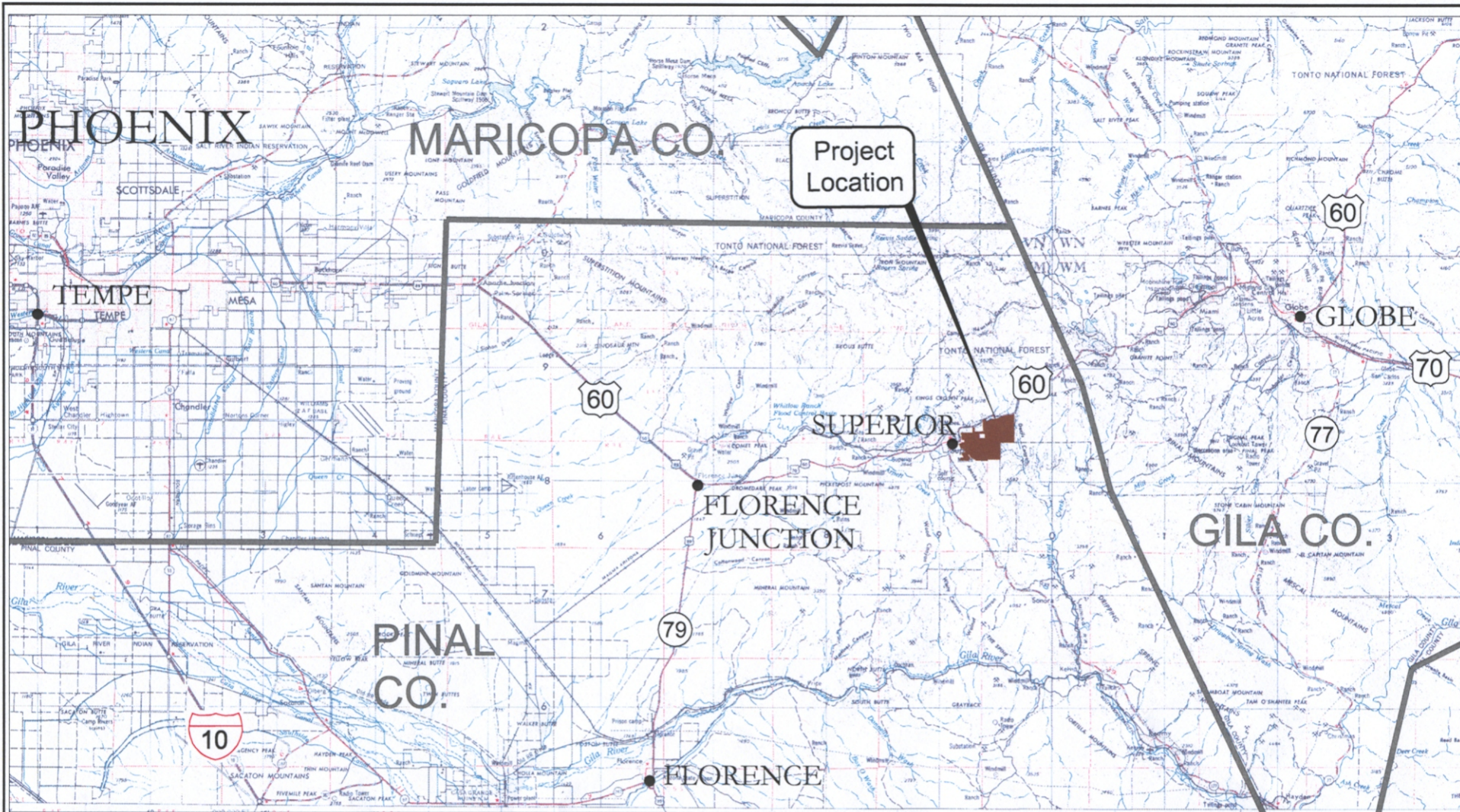
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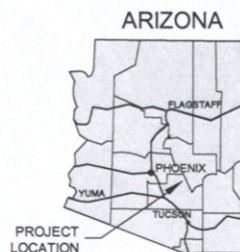
FIGURES



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

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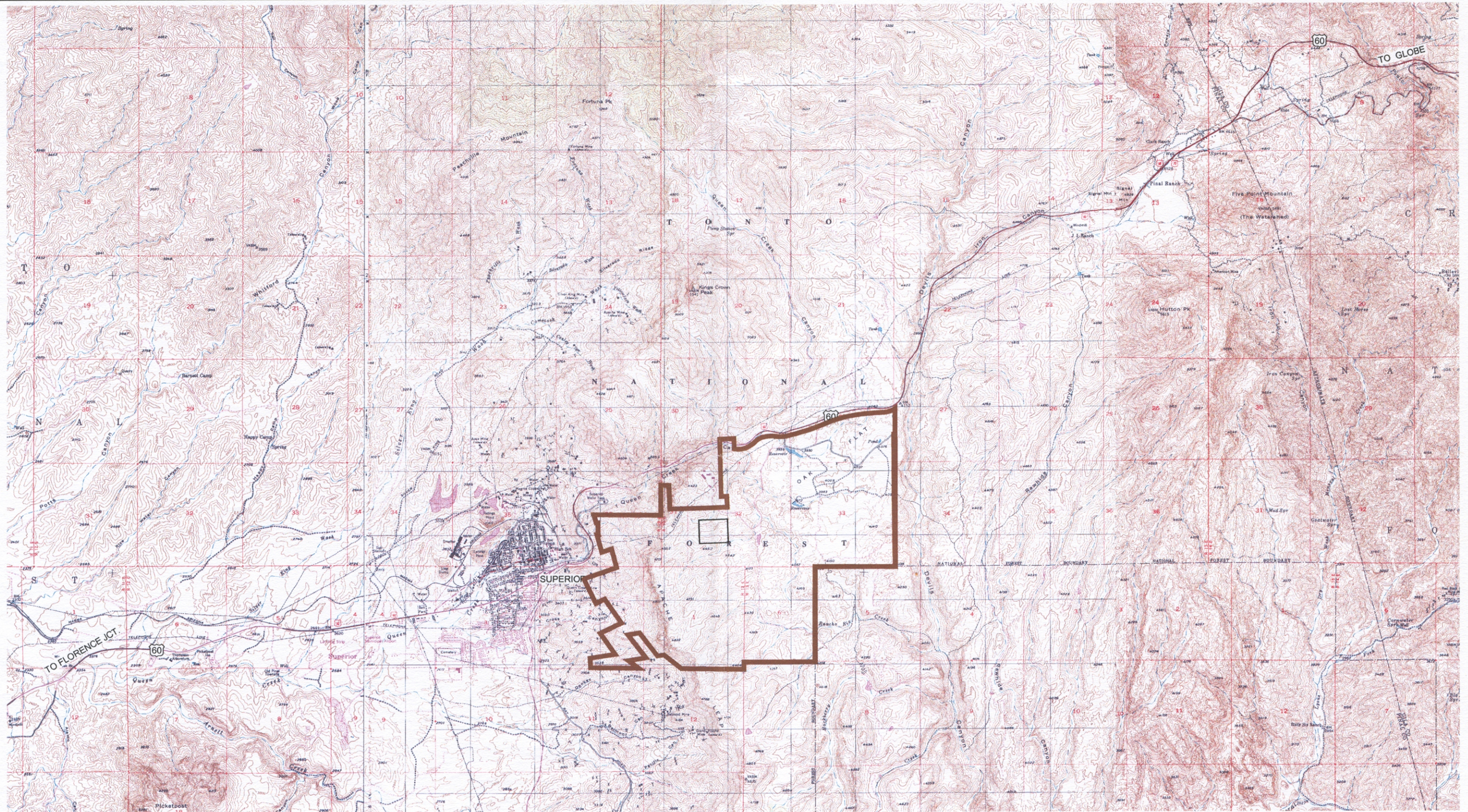
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Resolution Parcel
Resolution Baseline Report

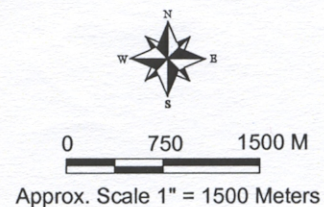
VICINITY MAP
Figure 1

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Pinal County, Arizona
Picketpost Mtn, Superior & Pinal Ranch 7.5' USGS Quadrangles

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LEGEND

- Project Boundary
- Private



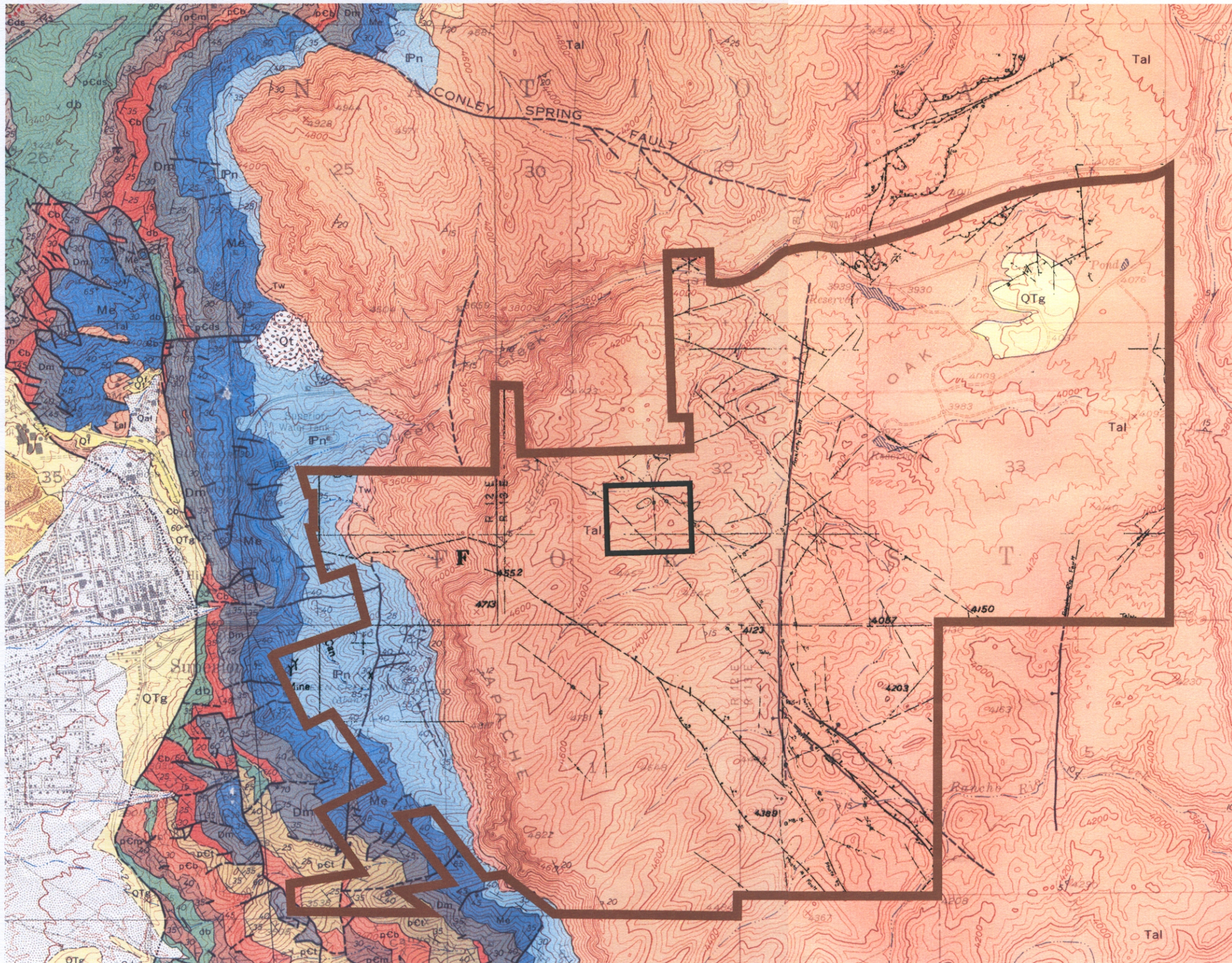
Resolution
Copper Company

Resolution Parcel
Resolution Baseline Report








Resolution Parcel Study Area

Figure 2

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EXPLANATION


-  Qf
Tailing and slag piles, and fill
-  Qt
Talus and landslide material
-  Qal
Gravel and conglomerate
-  QTg
Gravel and conglomerate
-  Tal
Apache Leap Tuff
-  Tw
Whitetail Conglomerate
-  Pn
Naco Limestone
-  Me
Escabrosa Limestone
-  Dm
Martin Limestone
-  Cb
Bolsa Quartzite
-  db
Diabase
-  pCt
Troy Quartzite
-  pCb
Basalt
-  pCm
Mescal Limestone
-  pCds
Dripping Spring Quartzite
Dots indicate Barnes Conglomerate Membr.
-  pCp
Pioneer Formation
-  pCpl
Pinal Schist


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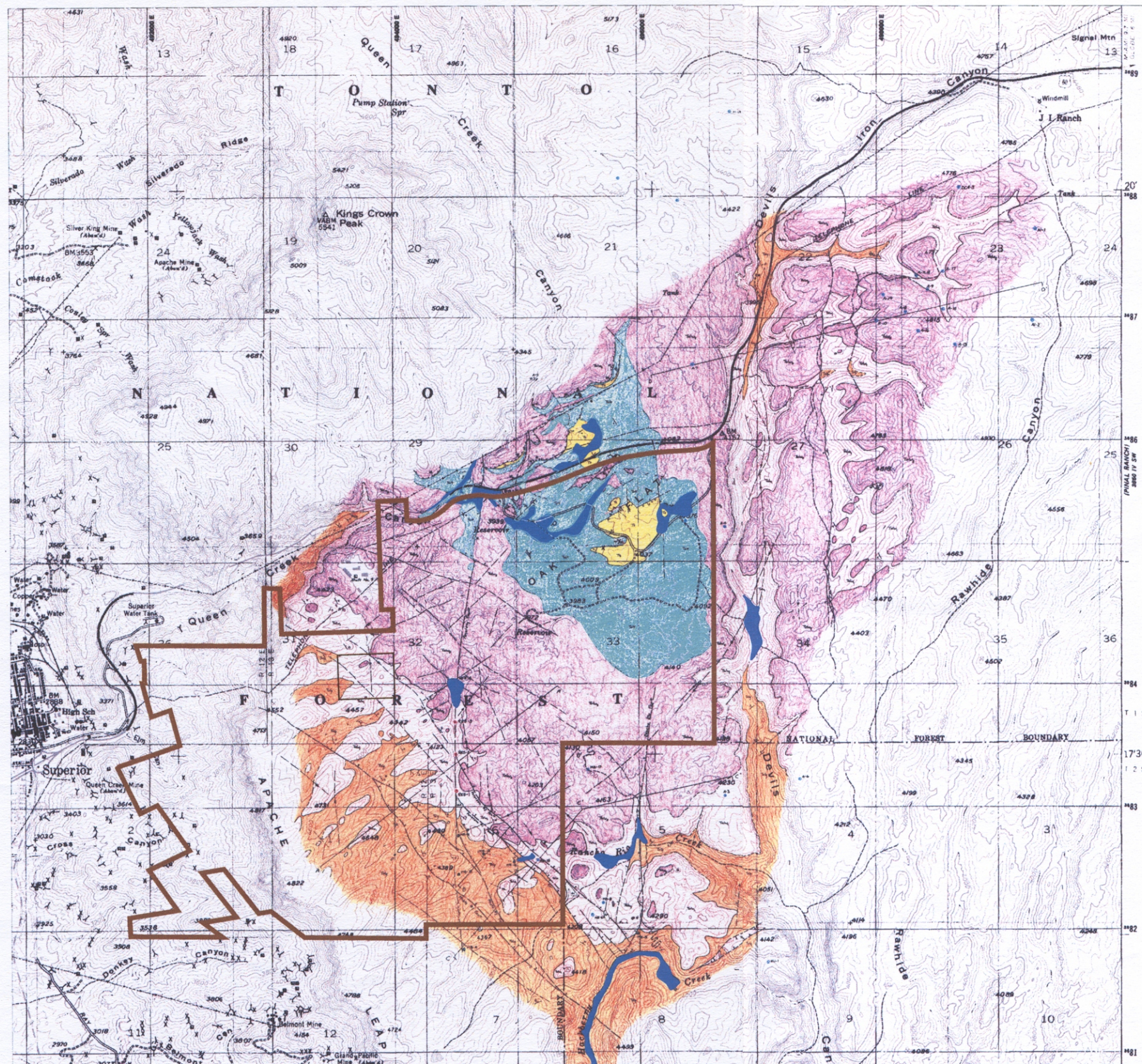

0 300 600 M
Approx. Scale 1" = 600 Meters

- LEGEND**
-  Parcel Boundary
 -  Private

Source: Peterson, D.W., 1969, Geologic Map of the Superior Quadrangle, Pinal County, Arizona, U.S. Geological Survey Map GQ-818.


Resolution Copper Company
Resolution Parcel
Resolution Baseline Report
Geologic Map of the Superior Quadrangle, Pinal County, Arizona
Figure 3

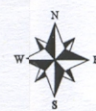
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Pinal County, Arizona
Superior 7.5' USGS Map

LEGEND

- Parcel Boundary
- Private



0 500 1000 M

Approx. Scale 1" = 1000 Meters

Source: Jonathan L. Gant
Kennecott Exploration Co.
March 2002, Unpublished

RESOLUTION PROJECT

GEOLOGIC MAP

Explanation

- Q Alluvium (Qal)
- T Lacustrine Sediments (Ts)
- APACHE LEAP TUFF (Ta1)
- Top of White Tuff (Talt)
- Upper White Tuff (Talu₂)
- Lower White Tuff (Talu₁)
- Gray Tuff (Talg)

- Contact, dashed where approximately located
- High angle fault, ball on downthrown side
- Prominent joint or fault with no significant vertical displacement
- Other photolinear of undetermined offset
- Thrust fault, showing measured dip

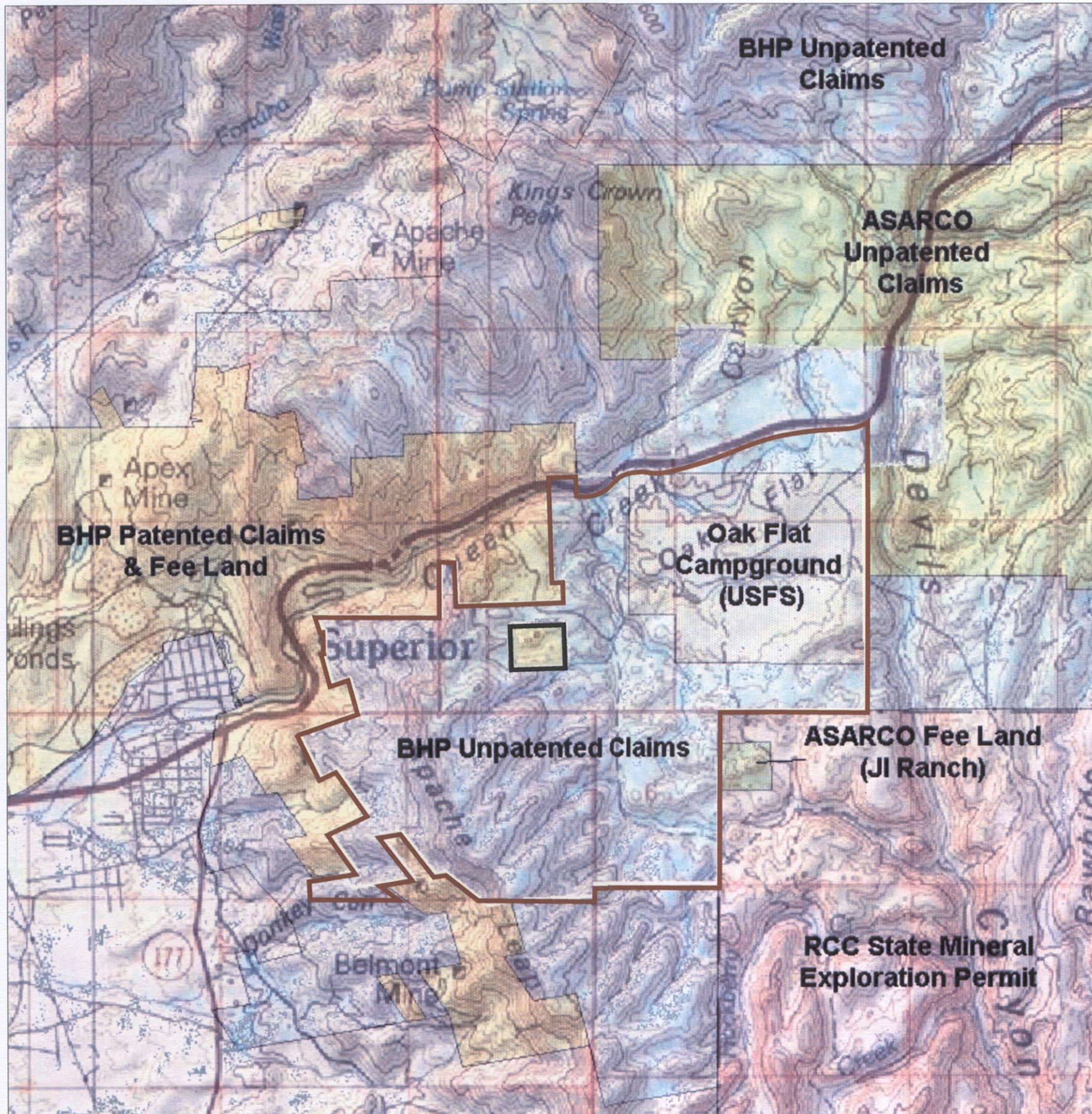


Resolution Parcel
Resolution Baseline Report

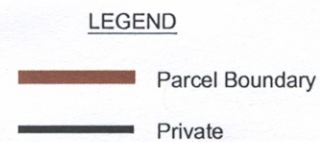
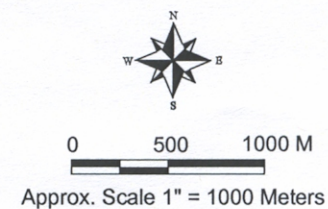
Surficial Geology Map


Figure 4

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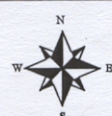


Pinal County, Arizona
Source: Resolution Copper Company





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0' 250' 500'

Looking North

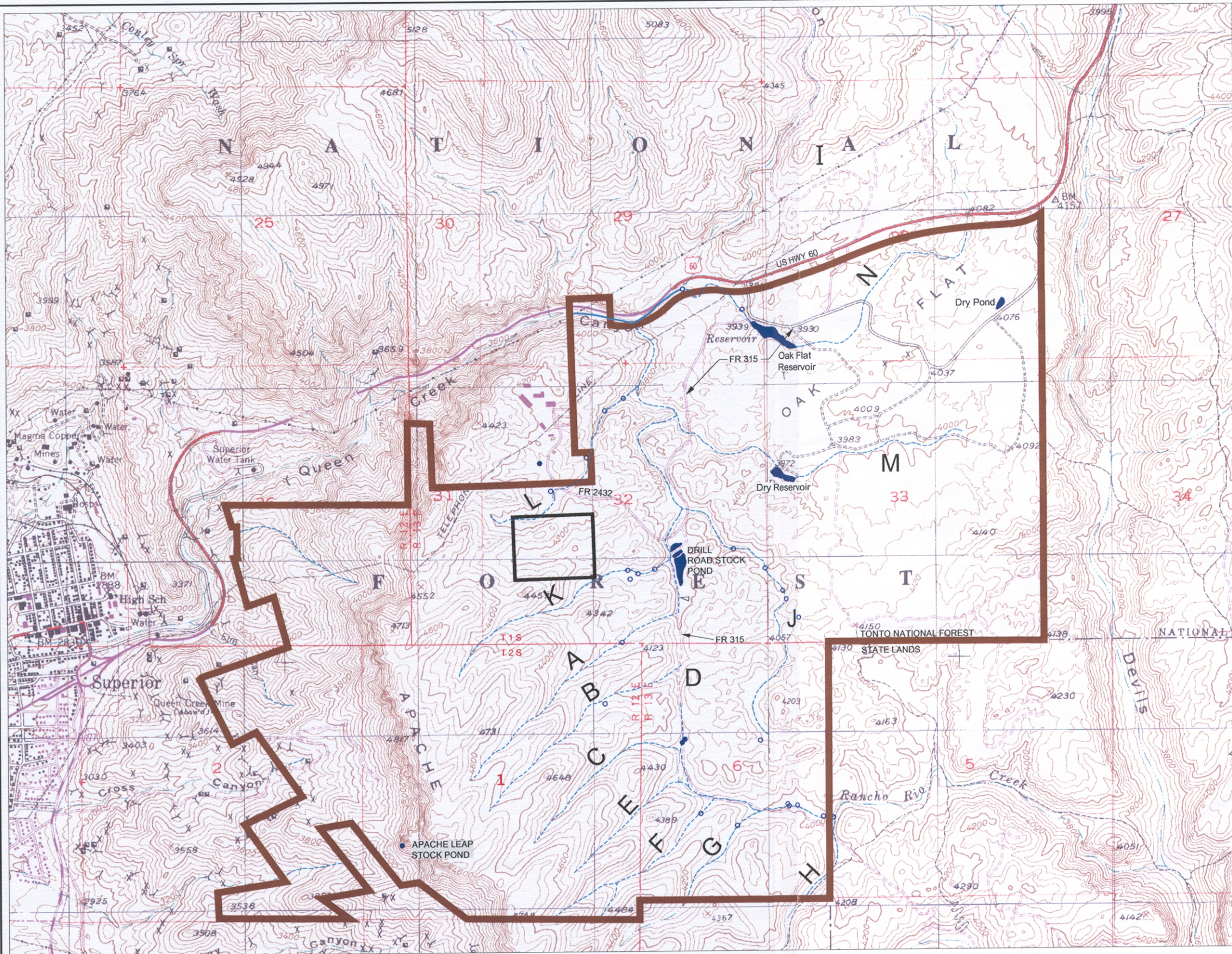
LEGEND

- Parcel Boundary
Private

ROCK CLIMBING FEATURES

Figure 6

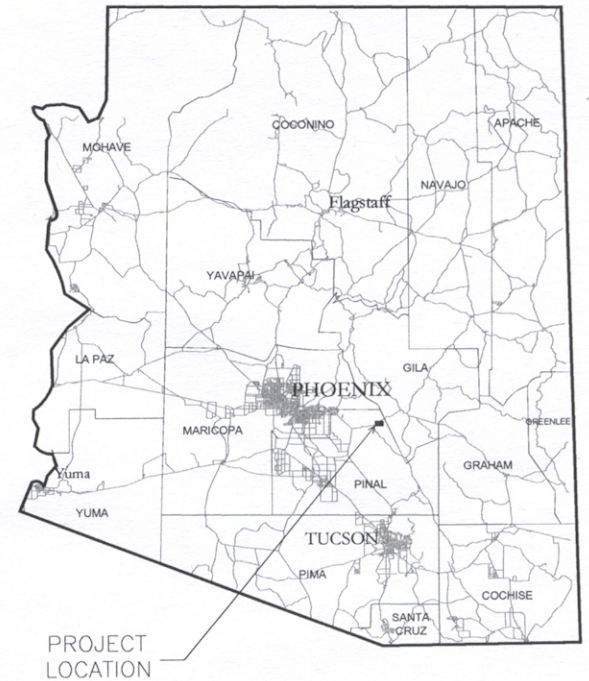
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Pinal County, Arizona
Superior, 1:24000 USGS Maps

CONTEXT MAP



LEGEND

- Parcel Boundary
- Private
- Ephemeral Drainage
- Intermittent Stream
- Pond, Reservoir or Stock Tank
- Pool or Tinaja
- K Drainage Identification
- FR FOREST ROAD

0 300 600 M
Scale 1" = 600 Meters

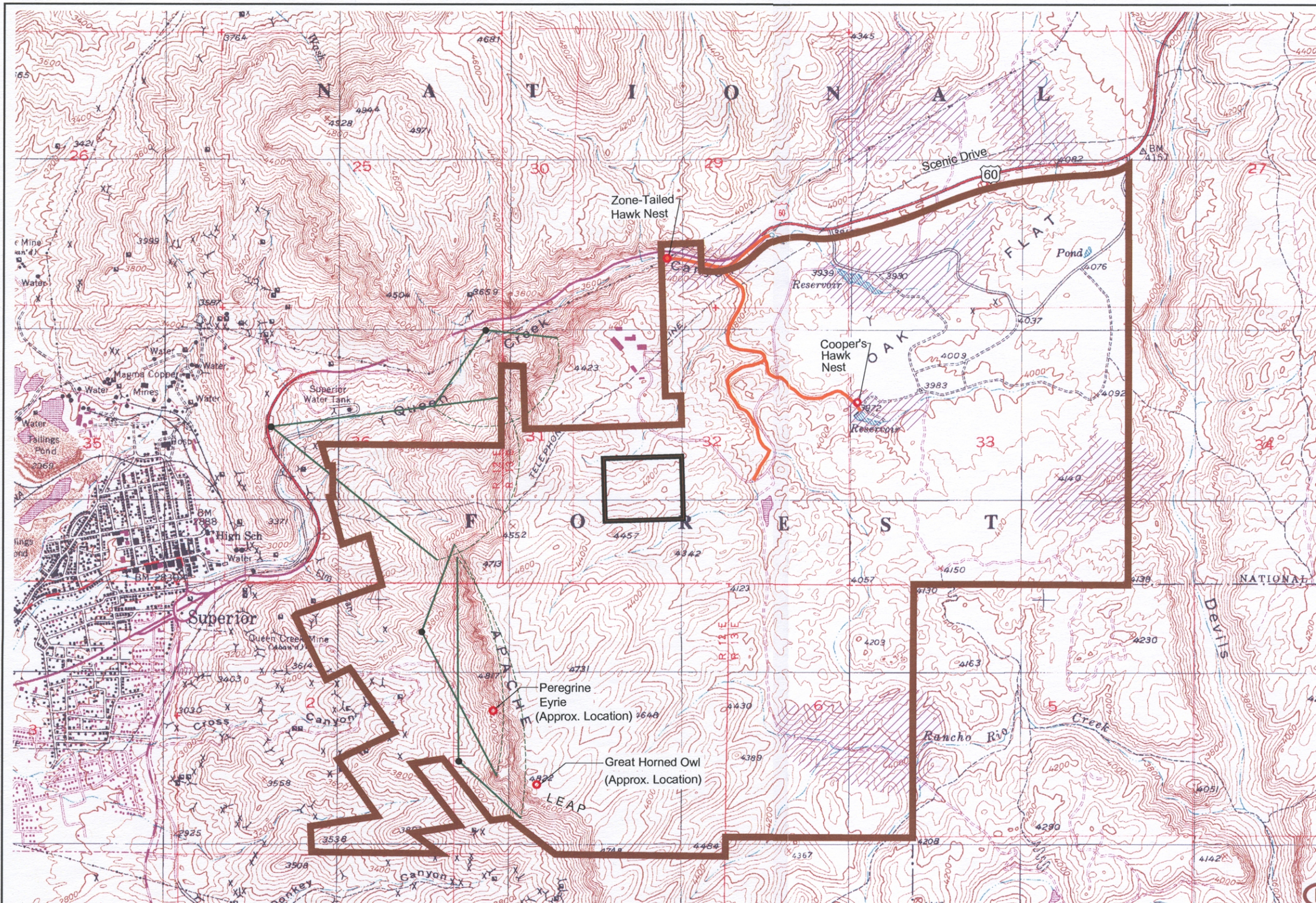


**Resolution
Copper Company**
Resolution Parcel
Resolution Baseline Report

Surface Water Features

Figure 7

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0 300 600 M

Scale 1" = 600 Meters

LEGEND

- Fixed Point Cliff Survey
- Project Boundary
- Private (BHP)
- Linear Transect Survey
- Lines represent field of view
- Variable Transect Survey

Pinal County, Arizona
Superior 7.5' USGS Map

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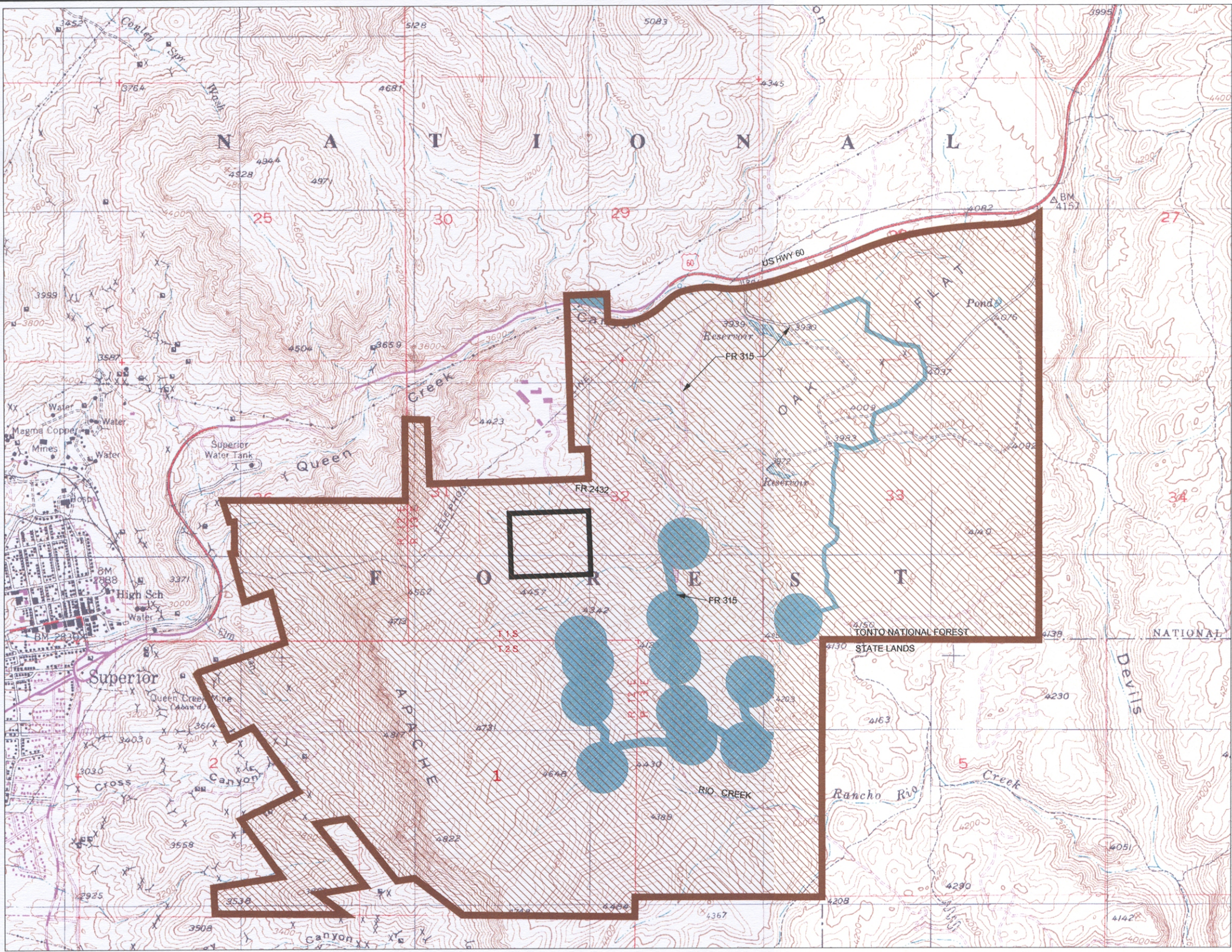
Resolution
Copper Company

Resolution Parcel
Resolution Baseline Report

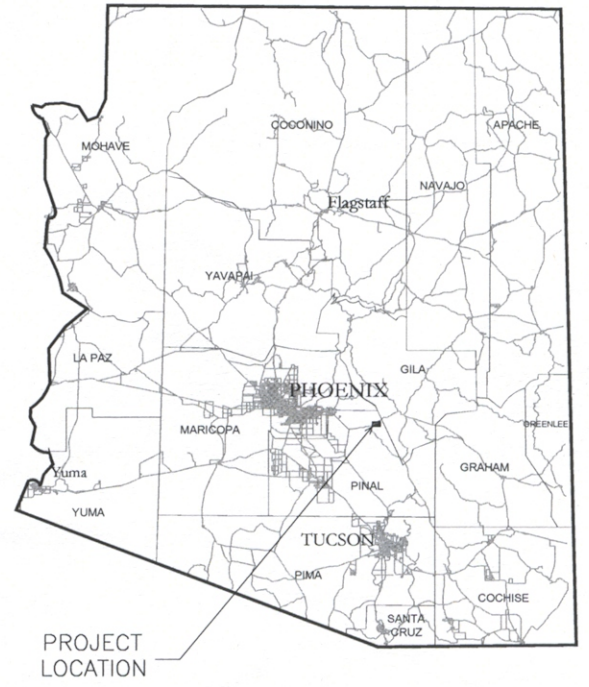
Raptor Observation Map

Figure 9

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CONTEXT MAP



LEGEND

- FR FOREST ROAD
- PARCEL BOUNDARY
- PRIVATE
- HEDGEHOG SURVEY AREAS
 - INTENSIVE SURVEY AREAS
 - WIDE-AREA SURVEYS

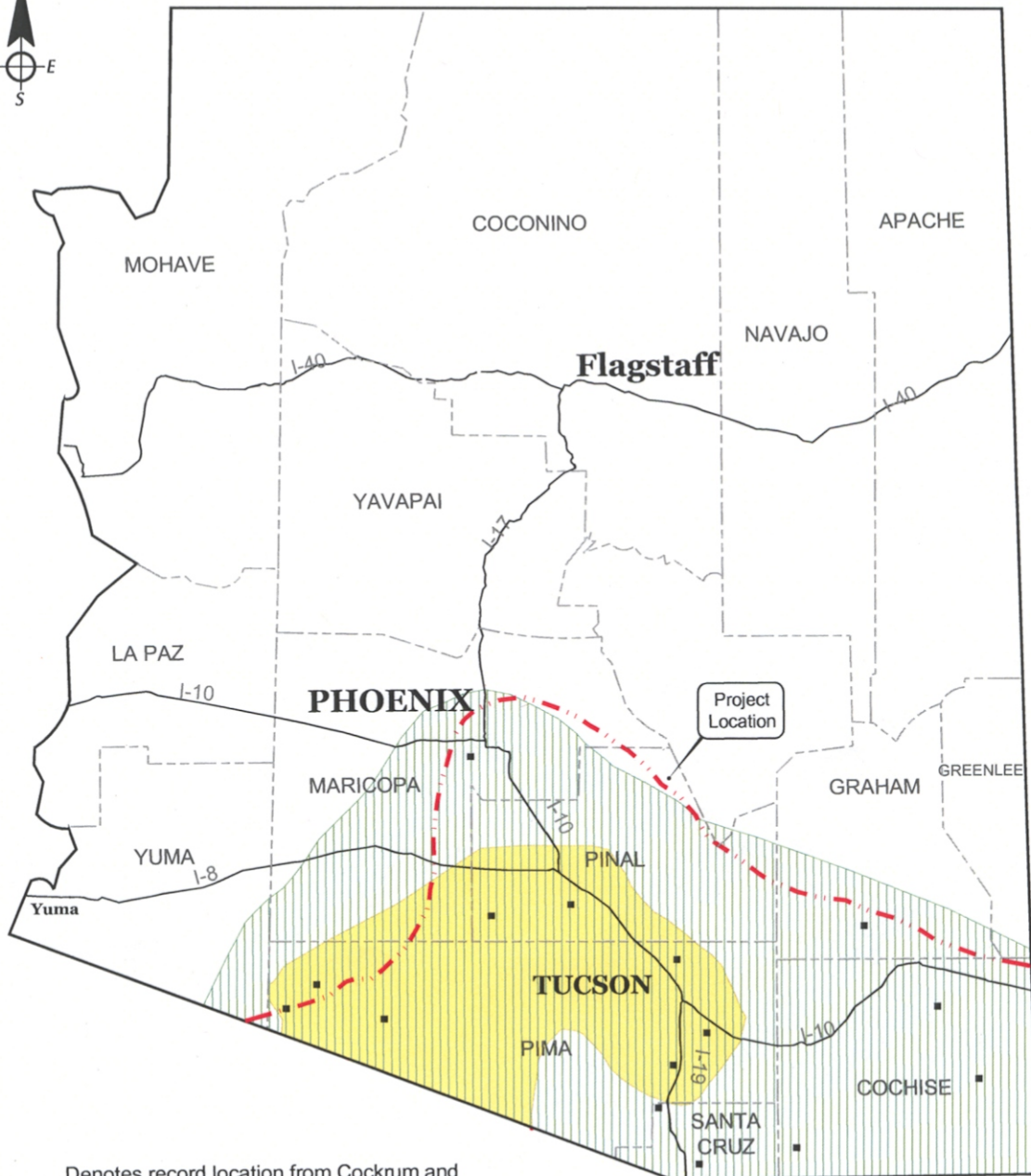
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Scale 1" = 600 Meters



Resolution Parcel
Resolution Baseline Report

Arizona Hedgehog Survey Areas
Figure 10

ARIZONA



■ Denotes record location from Cockrum and Petryszyn 1991

--- Limits of range shown by Hoffmeister 1986 (summer only)

Yellow box: Late spring and early summer records from Cockrum and Petryszyn 1991

Green hatched box: Late summer and fall records from Cockrum and Petryszyn 1991

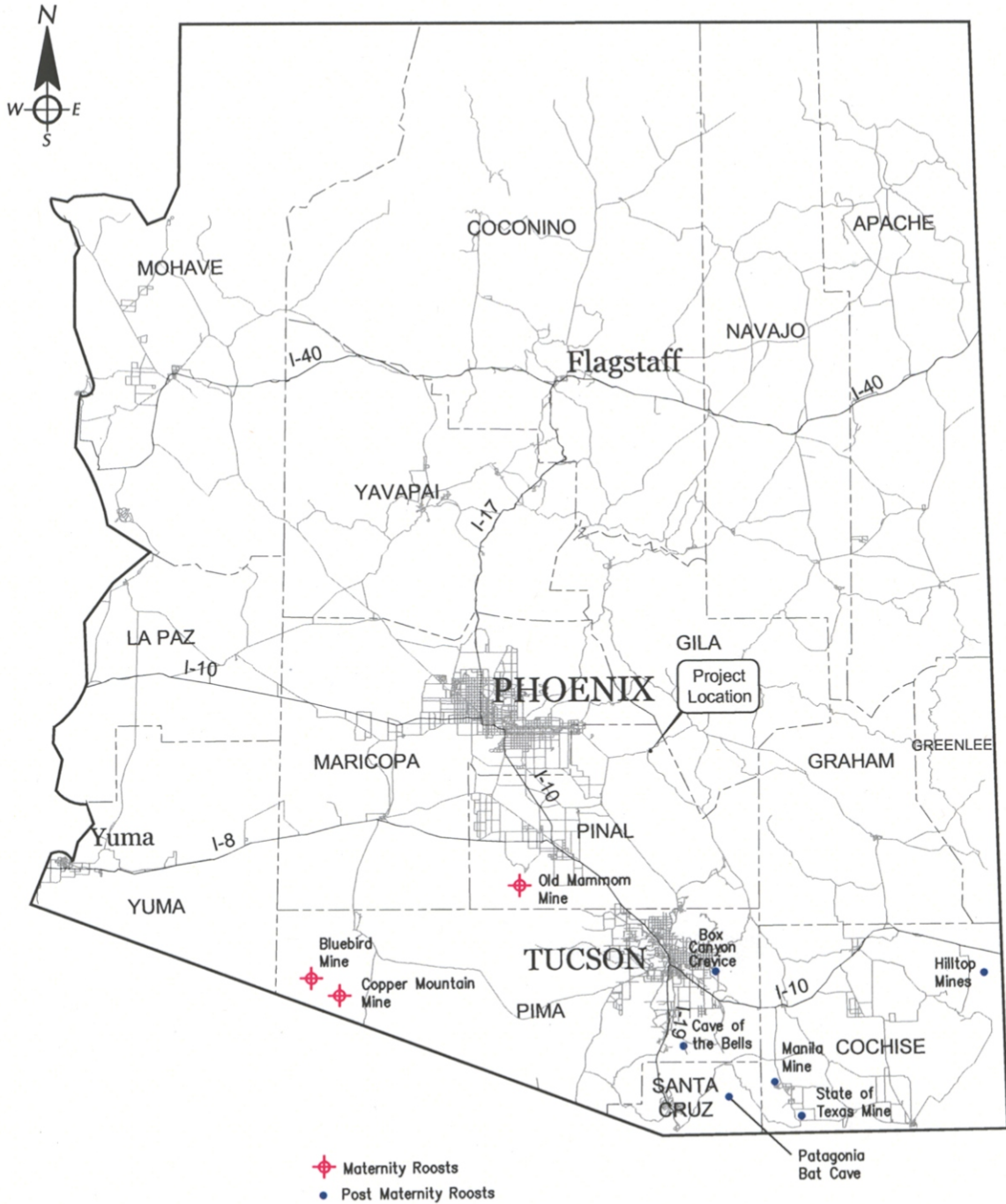


Resolution Parcel Resolution Baseline Report

Arizona Range of the Lesser Long-nosed Bat
(from Hoffmeister 1986, and Cockrum and Petryszyn 1991)

Figure 11

ARIZONA



Resolution Parcel Resolution Baseline Report

Major Roost Sites of Lesser Long Nosed Bat
in Arizona

Figure 12

APPENDIX A

SELECTED SITE PHOTOS



Photo 1. Apache Leap Escarpment looking east.



Photo 2. Sonoran desert scrub - Arizona Upland vegetation on west side of Apache Leap.



Photo 3. Interior chaparral vegetation with Apache Leap tuff outcrop (east side of Leap Escarpment).

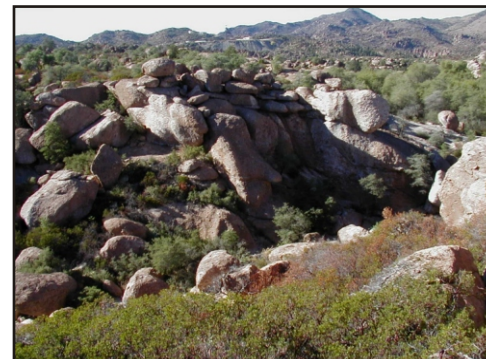


Photo 4. Apache Leap Tuff boulders (east side of Leap Escarpment).



Photo 5. Interior chaparral vegetation (east of Leap Escarpment) with high cover and less outcrop.



Photo 6. Queen Creek.



Photo 7. Stock pond near Oak Flat Campground.

APPENDIX B

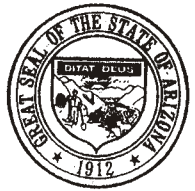
SPECIAL-STATUS SPECIES DATA FROM AGENCIES



THE STATE OF ARIZONA
GAME AND FISH DEPARTMENT

2221 WEST GREENWAY ROAD, PHOENIX, AZ 85023-4399
(602) 942-3000 • AZGFD.COM

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May 1, 2003

RECEIVED

MAY - 2 2003

Ms. Amanda Best
WestLand Resources, Inc.
2343 E. Broadway Blvd.
Suite 202
Tucson, AZ 85719

Re: Special Status Species Information for **Township 1 South, Range 13 East, Sections 28, 29, and 31-33; Township 1 South, Range 12 East, Section 36; Township 2 South, Range 13 East, Section 6; Township 2 South, Range 12 East, Sections 1 and 2; Proposed Development, Westland Job # 807.03 RS 340.**

Dear Ms. Best:

The Arizona Game and Fish Department (Department) has reviewed your request, dated April 23, 2003, 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 area (3-mile buffer). In addition, this project does not occur in the vicinity of any proposed or designated 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

Ms. Amanda Best


May 1, 2003

2

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, state-wide and county distribution lists, and abstracts for some special status species are also available on our web site at: http://www.azgfd.com/wildlife_conservation/edits/species_concern.html.

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 #04-23-03(18)

Special Status Species within 3 Miles of T1S,R13E Sec 28, 29, 31-33; T1S,R12E Sec 36; T2S,R13E Sec 6; T2S,R12E Sec 1, 2

Arizona Game and Fish Department, Heritage Data Management System

May 1, 2003

Scientific Name	Common Name	ESA	USFS	BLM	WSCA	NPL
<i>ECHINOCEREUS TRIGLOCHIDIATUS</i> VAR <i>ARIZONICUS</i>	ARIZONA HEDGEHOG CACTUS	LE	S			HS
<i>GOPHERUS AGASSIZII</i> (SONORAN POPULATION)	SONORAN DESERT TORTOISE	SC			WSC	
<i>MYOTIS CILIOLABRUM</i>	WESTERN SMALL-FOOTED MYOTIS	SC		S		
<i>NYCTINOMOPS FEMOROSACCUS</i>	POCKETED FREE-TAILED BAT			S		
<i>RANA YAVAPAIENSIS</i>	LOWLAND LEOPARD FROG	SC	S		WSC	
<i>THELYPTERIS PUBERULA</i> VAR <i>SONORENSIS</i>	ARAVAIPA WOOD FERN			S		

No Critical Habitats in project area. AGFD #04-23-03(17), San Pedro Bridges, Eastbound and Westbound, Structures #1530 and 1531; TRACS #010 CH 306 H6292 01C.

STATUS DEFINITIONS
ARIZONA GAME AND FISH DEPARTMENT (AGFD)
HERITAGE DATA MANAGEMENT SYSTEM (HDMS)

FEDERAL US STATUS

ESA **Endangered Species Act** (1973 as amended)
US Department of Interior, Fish and Wildlife Service (<http://arizonaes.fws.gov>)

Listed

- LE** Listed Endangered: imminent jeopardy of extinction.
- LT** Listed Threatened: imminent jeopardy of becoming Endangered.
- XN** Experimental Nonessential population.

Proposed for Listing

- PE** Proposed Endangered.
- PT** Proposed Threatened.

Candidate (Notice of Review: 1999)

- C** Candidate. Species for which USFWS has sufficient information on biological vulnerability and threats to support proposals to list as Endangered or Threatened under ESA. However, proposed rules have not yet been issued because such actions are precluded at present by other listing activity.
- SC** Species of Concern. The terms "Species of Concern" or "Species at Risk" should be considered as terms-of-art that describe the entire realm of taxa whose conservation status may be of concern to the US Fish and Wildlife Service, but neither term has official status (currently all former C2 species).

Critical Habitat (check with state or regional USFWS office for location details)

- Y** Yes: Critical Habitat has been designated.
- P** Proposed: Critical Habitat has been proposed.

[**N** No Status: certain populations of this taxon do not have designated status (check with state or regional USFWS office for details about which populations have designated status)].

USFS **US Forest Service** (1999 Animals, 1999 Plants: corrected 2000)
US Department of Agriculture, Forest Service, Region 3 (<http://www.fs.fed.us/r3/>)

- S** Sensitive: those taxa occurring on National Forests in Arizona which are considered sensitive by the Regional Forester.

BLM **US Bureau of Land Management** (2000 Animals, 2000 Plants)
US Department of Interior, Bureau of Land Management, Arizona State Office
(<http://azwww.blm.gov>)

- S** Sensitive: those taxa occurring on BLM Field Office Lands in Arizona which are considered sensitive by the Arizona State Office.
- P** Population: only those populations of Banded Gila monster (*Heloderma suspectum cinctum*) that occur north and west of the Colorado River, are considered sensitive by the Arizona State Office.

STATE STATUS**NPL Arizona Native Plant Law (1999)**

Arizona Department of Agriculture (<http://agriculture.state.az.us/PSD/nativeplants.htm>)

- HS** Highly Safeguarded: no collection allowed.
- SR** Salvage Restricted: collection only with permit.
- ER** Export Restricted: transport out of State prohibited.
- SA** Salvage Assessed: permits required to remove live trees.
- HR** Harvest Restricted: permits required to remove plant by-products.

WSCA Wildlife of Special Concern in Arizona (in prep)

Arizona Game and Fish Department (<http://www.azgfd.com>)

- WSC** Wildlife of Special Concern in Arizona. Species whose occurrence in Arizona is or may be in jeopardy, or with known or perceived threats or population declines, as described by the Arizona Game and Fish Department's listing of Wildlife of Special Concern in Arizona (WSCA, in prep). Species indicated on printouts as WSC are currently the same as those in **Threatened Native Wildlife in Arizona (1988)**.

Revised 8/14/02, AGFD HDMS

J:\HDMS\DOCUMENT\NBOOKS\TEMPLATE\EORDEFS\STATDEF

Tonto National Forest Sensitive Species List

Last Update (3/28/2003)

Common Name	Species	Status	Tonto Occurrence
Federally Listed (19)			
Arizona Agave	<i>Agave arizonica</i>	E	Y
Arizona Hedgehog Cactus	<i>Echinocereus triglochidiatus</i> <i>var. arizonicus</i>	E	Y
Arizona Cliffrose	<i>Purshia subintegra</i>	E	Y
Bald Eagle	<i>Haliaetus leucocephalus</i>	T, WC, MIS	Y
Southwestern Willow Flycatcher	<i>Empidonax traillii extimus</i>	E, WC	Y, CH
Mexican Spotted Owl	<i>Strix occidentalis lucida</i>	T, WC	Y
Cactus Ferruginous Pygmy Owl	<i>Glaucidium brasilianum cactorum</i>	E, WC	H, CH
Yuma Clapper Rail	<i>Rallus longirostris yumanensis</i>	E, WC	H
Bonytail Chub	<i>Gila elegans</i>	E, WC	H
Desert Pupfish	<i>Cyprinodon macularius macularius</i>	E, WC	H
Colorado Pikeminnow (squawfish)	<i>Ptychocheilus lucius</i>	E, WC	Y – some ENE
Loach minnow	<i>Tiaroga cobitis</i>	T, WC	H, CH
Spikedace	<i>Meda fulgida</i>	T, WC	H, CH
Woundfin	<i>Plagopterus argentissimus</i>	E, WC	H, some ENE
Razorback Sucker	<i>Xyrauchen texanus</i>	E, WC	Y, CH
Gila Topminnow	<i>Poeciliopsis occidentalis occidentalis</i>	E, WC	Y
Gila Trout	<i>Oncorhynchus gilae gilae</i>	E, WC	Y
Gila Chub	<i>Gila intermedia</i>	PE, WC	Y
Chiricahua Leopard Frog	<i>Rana chiricahuensis</i>	T, WC	Y
Lesser Long-nosed Bat	<i>Leptonycteris curasoae yerbabuenae</i>	E, WC	
Mexican Gray Wolf*	<i>Canis lupus baileyi</i>	E, WC	
Sensitive Birds (8)			
Western Yellow-billed Cuckoo	<i>Coccyzus americanus occidentalis</i>	S, WC, Candidate	Y
Peregrine Falcon	<i>Falco peregrinus anatum</i>	S, WC	Y
Common Black Hawk	<i>Buteogallus anthracinus</i>	S, WC, MIS	Y
Northern Goshawk	<i>Accipiter gentilis</i>	S, WC, MIS	Y

Common Name	Species	Status	Occurrence
Northern Gray Hawk	<i>Asturina nitida maxima</i>	S, WC	Y
Western Snowy Plover*	<i>Charadrius alexandrinus nivosus</i>	S, WC	Y, migrant only
Arizona Bell's Vireo	<i>Vireo bellii</i>	S, MIS	Y
Eared Trogon	<i>Euptilotis neoxenus</i>	S	Y
Sensitive Mammals (7)			
Desert Bighorn Sheep	<i>Ovis Canadensis mexicana</i>	S	Y
Southwestern River Otter	<i>Lutra Canadensis Sonora</i>	S, WC	H
California Leaf-nosed Bat	<i>Macrotus californicus</i>	WC, HP	Y
Western Red Bat	<i>Lasiurus blossevillii</i>	WC, HP	H
Spotted Bat	<i>Euderma maculatum</i>	WC, HP	
Allen's Big-eared Bat	<i>Idionycteris phyllotis</i>	HP	Y
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i> (formerly <i>Plecotus</i>)	HP	Y
Sensitive Amphibians (3)			
Lowland Leopard Frog	<i>Rana yavapaiensis</i>	S, WC	Y
Arizona Southwestern Toad	<i>Bufo microscaphus microscaphus</i>	S	Y
Sensitive Reptiles (6)			
Sonoran Desert Tortoise	<i>Gopherus agassizii</i>	S, WC	Y
Arizona Night Lizard	<i>Xantusia vigilis arizonae</i>	S	Y
Maricopa Leafnose Snake	<i>Phyllorhynchus browni lucidus</i>	S	Y
Mexican Garter Snake	<i>Thamnophis eques megalops</i>	S, WC	Y
Narrow-headed Garter Snake	<i>Thamnophis rufipunctatus</i>	S, WC	Y
Gila Monster	<i>Heloderma speculatum</i>		Y
Sensitive Fish (8)			
Roundtail Chub	<i>Gila robusta</i>	S, WC	Y
Flannelmouth Sucker	<i>Catostomus latipinnis</i>	S	Y
Headwater Chub	<i>Gila nigra</i>		Y
Longfin Dace	<i>Agosia chrysogaster</i>		Y
Speckled Dace	<i>Rhinichthys osculus</i>		Y
Sonora Sucker	<i>Catostomus insignis</i>		Y
Desert Sucker	<i>Catostomus clarki</i>		Y
Sensitive Plants (21)			
Blumer's Dock	<i>Rumex orthoneurus</i>	S	Y
Tonto Basin Agave	<i>Agave delamateri</i>	S	Y
Hohokam Agave	<i>Agave murpheyi</i>	S	Y
Chihuahua Sedge	<i>Carex chihuahuaensis</i>	S	Y
Arizona Giant Sedge	<i>Carex ultra</i>	S	

Common Name	Scientific Name	Status	Range
Arizona Bugbane	<i>Cimicifuga arizonica</i>	S	Y
Mogollon Fleabane	<i>Erigeron anchana</i>	S	Y
Fish Creek Fleabane	<i>Erigeron piscaticus</i>	S	Y
Mogollon Thistle	<i>Cirsium parryi</i> ssp. <i>Mogollonicum</i>	S	
Ripley Wild Buckwheat	<i>Eriogonum ripleyi</i>	S	Y
Eastwood Alum Root	<i>Heuchera eastwoodiae</i>	S	Y
Arizona Alum Root	<i>Heuchera glomerulata</i>	S	Y
Alamos Deer Vetch	<i>Lotus alamosanus</i>	S	Y
Mapleleaf False Snapdragon	<i>Mabrya acerifolia</i>	S	Y
Sweet Cicely	<i>Osmorhiza brachypoda</i>	S	Y
Flagstaff Beardtongue	<i>Penstemon nudiflorus</i>	S	Y
Gila Rock Daisy	<i>Perityle gilensis</i> var. <i>gilensis</i>	S	
Gila Rock Daisy	<i>Perityle gilensis</i> var. <i>salensis</i>	S	
Fish Creek Rock Daisy	<i>Perityle saxicola</i>	S	Y
Arizona Phlox	<i>Phlox amabilis</i>	S	Y
Aravaipa Sage	<i>Salvia amissa</i>	S	Y
Sensitive Invertebrates (15)			
Tiger Beetles			
Cow Path Tiger Beetle	<i>Cicindela purpurea cimarrona</i>	S	
Hairy-Necked Tiger Beetle	<i>Cicindela hirticollis</i> <i>corpuscula</i>	S	
Maricopa Tiger Beetle	<i>Cicindela oregona maricopa</i>	S	Y
Tiger Beetle	<i>Cicindela praetextata</i> <i>pallidofemora</i>	S	
Flies			
Netwing Midge	<i>Agathon arizonicus</i>	S	Y
Beetles			
Parker's Riffle Beetle	<i>Cylloepus parkeri</i>	S	Y
Dragonflies			
Hoary Skimmer	<i>Libelula nodisticta</i>	S	
Arizona Snaketail	<i>Ophiogomphus arizonicus</i>	S	
Butterflies			
Evansi Brigadier	<i>Agathymus evansi</i>	S	
Neumogen's Giant Skipper	<i>Agathymus neumoeogeni</i>	S	
Comstock's Hairstreak	<i>Callophrys Comstock</i>	S	
Obsolete Viceroy Butterfly	<i>Limenitis archippus</i>	S	Y
Arizona Copper	<i>Lycaena ferrisi</i>	S	
Spotted Skipperling	<i>Piruna polingii</i>	S	

Common Name	Species	Status	Occurrence
Springsnails			
Fossil springsnail	<i>Pyrgulopsis simplex</i>	S	Y

TOTAL = 87 SPECIES

Key:

- * = may be dropped from list; need to clarify
- S = on Regional Forester's Sensitive Species List (7/21/99)
- E = Federally Listed as Endangered, under Endangered Species Act (ESA)
- T = Federally Listed as Threatened, under ESA
- WC = Wildlife of Special Concern in Arizona (AZ Game and Fish Dept. Draft 3/16/96)
- HP = High Priority Species; "at high risk of imperilment" (Western Bat Species Regional Priority Matrix (1998).
- MIS = Tonto National Forest Management Indicator Species (Tonto Plan 1985)
- Y = Known to occur on Tonto
- H = Historically known from Tonto
- CH = Critical Habitat designated on Tonto
- PCH = Proposed Critical Habitat designated on Tonto
- ENE = Reintroduced populations designated as Experimental - Nonessential, under ESA.

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County Species Lists-Pinal County

Common Name	Scientific Name	Status	Description	County	Elevation Range	Habitat	Comments
▼ 1) Listed							
Arizona hedgehog	<i>Echinocereus triglochidiatus</i> var. <i>arizonicus</i>	Endangered	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.	Gila Pinal	3,700-5,200 ft	Ecotone between interior chaparral and madrean evergreen woodland.	Open slopes, in narrow cracks between boulders, and in understory of shrubs. Additional genetic studies have determined that the species does not occur outside of the type locality.
Bald eagle	<i>Haliaeetus leucocephalus</i>	Threatened	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.	Apache Cochise Coconino Gila Graham La Paz Maricopa Mohave Navajo Pima Pinal Santa Cruz Yavapai Yuma	Varies	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, and loss of habitat continues to be a problem. Species has been proposed for delisting (64 FR 36454) but still receives full protection under

Cactus ferruginous pygmy-owl	<i>Glaucidium brasilianum cactorum</i>	Endangered	Small (Approx. 7"), diurnal owl reddish brown overall with cream-colored belly streaked with reddish brown. Some individuals are grayish brown.	Cochise Gila Graham Greenlee Maricopa Pima Pinal Santa Cruz Yuma	<4000 ft	Mature cottonwood/willow, mesquite bosques, and Sonoran desertscrub	the ESA. 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.
California Brown pelican	<i>Pelecanus occidentalis californicus</i>	Endangered	Large dark gray-brown water bird with a pouch underneath long bill and webbed feet. Adults have a white head and neck, brownish black breast, and silver gray upper parts.	Apache Cochise Coconino Gila Graham Greenlee La Paz Maricopa Mohave Navajo Pima Pinal Santa Cruz Yavapai Yuma	Varies	Coastal land and islands; species found around many Arizona lakes and rivers	Proposed critical habitat occurs in Pima and Pinal counties (67 FR71032; 11-27-02). Subspecies is found on Pacific Coast and is endangered due to pesticides. It is an uncommon transient in Arizona on many Arizona lakes and rivers. Individuals wander up from Mexico in summer and fall. No breeding records in Arizona.
Desert pupfish	<i>Cyprinodon macularius</i>	Endangered	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 and juveniles tan to olive colored back and silvery sides.	Graham La Paz Maricopa Pima Pinal Santa Cruz Yavapai	< 5,000 ft	Shallow springs, small streams, and marshes. Tolerates saline and warm water.	Critical habitat includes Quitobaquito Springs, Pima County, portions of San Felipe Creek, Carrizo Wash, and Fish Creek Wash, Imperial County, California. Two subspecies are recognized: Desert Pupfish (<i>C.m.macularis</i>) and Quitobaquito Pupfish (<i>C.m.ereumus</i>).
Gila	<i>Poeciliopsis</i>	Endangered	Small (2 inches),	Gila	< 4,500 ft	Small streams,	Species historically occurred

topminnow	<i>occidentalis</i> <i>occidentalis</i>	guppy-like, live bearing, lacks dark spots on its fins. Breeding males are jet black with yellow fins.	Graham La Paz Maricopa Pima Pinal Santa Cruz Yavapai		springs, and cienegas vegetated shallows.	in backwaters of large rivers but is currently isolated to small streams and springs.
Lesser long-nosed bat	<i>Leptonycteris curasoae yerbabuena</i>	Endangered 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.	Cochise Gila Graham Greenlee Pima Pinal Maricopa Santa Cruz Yavapai	< 6000 ft	Desert scrub habitat with agave and columnar 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 September and south of the border the remainder of the year.
Loach minnow	<i>Tiaroga cobitis</i>	Threatened Small (<3 inches) slender, elongated fish, olive colored with dirty white spots at the base of the Pinal dorsal and caudal fins. Breeding males vivid red on mouth and base of fins.	Apache *Cochise Graham Greenlee Gila *Pima at the base of the Pinal dorsal and caudal Navajo *Yavapai	<8000 ft	Benthic species of small to large perennial streams with swift shallow water over cobble and gravel. Recurrent flooding and natural hydrograph important.	Presently found in Aravaipa Creek, Blue River, Campbell Blue Creek, San Francisco River, Dry Blue River, and the mainstem upper Gila River. Critical habitat was removed March 1998; but re-proposed December 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.
Mexican spotted owl	<i>Strix occidentalis lucida</i>	Threatened Medium sized with dark eyes and no ear tufts. Brownish and heavily spotted with white or beige.	Apache Cochise Coconino Gila Graham Greenlee Maricopa Mohave	4100-9000 ft	Nests in canyons and dense forests with multi-layered foliage structure.	Generally nests in older forests of mixed conifer or ponderosa pine/gambel oak type, in canyons, and use variety of habitats for foraging. Sites with cool microclimates appear to be of importance or are

Navajo
Pima Pinal
Santa Cruz
Yavapai

preferred. Critical habitat was removed in 1998 but re-proposed in July 2000 and finalized in February 2001 for Apache, Cochise, Coconino, Graham, Mohave, Pima counties; Also in New Mexico, Utah, and Colorado. 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.

**Nichol Turk's
head cactus** *Echinocactus
horizonthalonius
var. nicholii*

Endangered 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; 2 spines
upward and red
or vasally gray.
Flower: pink fruit:
woolly white.

2400-
4100 ft

Pima Pinal
Sonoran desertscrub

**Razorback
sucker**

*Xyrauchen
texanus*

Endangered Large (up to 3
feet long and up
to 6 lbs, high
sharp-edged
keel-like hump
behind the head. Maricopa
Head flattened on Mohave
top. Olive-brown
above to
yellowish below.

< 6000 ft

Coconino
Gila
Graham
Greenlee La
Paz
Maricopa
Mohave
Pinal
Yavapai
Yuma

Riverine and 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 the Grand Canyon from confluence with Paria River to Hoover Dam; Hoover Dam to Davis Dam; Parker Dam to Imperial Dam. Also Gila River from Arizon/New Mexico border to Coolidge Dam; and Salt River from Hwy 60/SR77 Bridge to Roosevelt Dam; Verde River from FS boundary to Horseshoe Lake.

**Southwestern
willow flycatcher** *Empidonax traillii
extimus*

Endangered Small passerine
(about 6 inches)

Apache
Cochise

<8500 ft Cottonwood/willow and
tamarisk vegetation

Migratory riparian obligate
species that occupies

grayish-green back and wings, whitish throat, light olive-gray breast and pale yellowish belly. Two wingbars visible. Eye-ring faint or absent.

Coconino
Gila
Graham
Greenlee La Paz
Maricopa
Mohave
Navajo
Pima Pinal
Santa Cruz
Yavapai
Yuma

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 was set aside by the 10th Circuit Court of Appeals (May 17, 2001).

communities along rivers and streams.

Spikedace *Meda fulgida*

Threatened

Small (<3 inches) slim with silvery sides and "spine" on dorsal fin. Breeding males brassy golden color.

*Apache
*Cochise
Graham
Greenlee
*Gila
Navajo
*Pima Pinal
Yavapai

< 6000 ft

Moderate to large perennial streams with gravel cobble substrates and moderate to swift velocities over sand and gravel substrates. Recurrent flooding and natural hydrograph important.

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 December 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.

Yuma clapper rail *Rallus longirostris yumanensis*

Endangered

Water bird with long legs and short tail. Long slender decurved bill. Mottled brown or gray on its rump. Flanks and undersides are dark gray with narrow vertical stripes producing a

Gila La Paz
Maricopa
Mohave
Pinal Yuma

< 4,500 ft

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.

2) Proposed

Proposed		barring effect.			
Gila chub	<i>Gila intermedia</i>	Proposed Endangered	Deep compressed body, flat head. Dark olive-gray color above, silver sides. Endemic to Gila River Basin.	Cochise Coconino Gila Graham Greenlee Maricopa Pima Pinal Santa Cruz Yavapai	2000 - 3500 ft
				Pools, springs, cienegas, and streams.	
					Multiple private landowners, including the Nature Conservancy, the Audubon Society, and others. Also Fort Huachuca. Species also found in Sonora, Mexico.
					Proposed critical habitat occurs in Cochise, Gila, Graham, Greenlee, Pima, Pinal, Santa Cruz and Yavapai counties.

▼ 3) *Candidate*

Acuna cactus	<i>Echinomastus erectocentrus</i> <i>var. acunensis</i>	Candidate	<12 inches high spine clusters borne on tubercles, each with a groove on the upper surface. 2-3 central spines and 12 radial spines. Flowers pink to purple.	Pima Pinal 1300- 2000 ft	Well drained knolls and gravel ridges in Sonoran desertscrub.	Immature plants distinctly different from mature plants. They are disc-shaped or spherical and have no central spines until they are about 1.5 inches. Radial spines are dirty white with maroon tips.
Yellow-billed cuckoo	<i>Coccyzus americanus</i>	Candidate	Medium sized bird with a slender, long- tailed profile, slightly down- curved bill, which is blue-black with yellow on the lower half of the bill. Plumage is grayish-brown above and white below, with rufous primary flight feathers.	Apache Cochise Coconino Gila Graham Greenlee La Paz Maricopa Mohave Navajo Pima Pinal Santa Cruz Yavapai Yuma	< 6,500 ft Large blocks of riparain woodlands (Cottonwood, willow, or tamarisk galleries).	Species was found warranted, but precluded for listing as a distinct vertebrate population segment in the western U.S. on July 25, 2001. This finding indicates that the Service has sufficient information to list the bird, but other, higher priority listing actions prevent the Service from addressing the listing of the cuckoo at this time.

APPENDIX C

SCREENING ANALYSIS

FEDERAL PARCEL SPECIAL-STATUS SPECIES SCREENING ANALYSIS

[Species in Bold were considered in greater detail in the BA/E]

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SPECIES	STATUS	KNOWN DISTRIBUTION AND HABITAT NEEDS	LIKELIHOOD OF OCCURANCE IN THE PROJECT AREA
AMPHIBIANS			
Chiricahua leopard frog (<i>Rana chiricahuensis</i>)	T, TNF, WSCA	Inhabits streams with deep, rock-bound pools, but may also occur in springs and stock tanks that support aquatic or herbaceous vegetation; only documented occurrences on the TNF are from Payson and Pleasant Valley Ranger Districts; generally at elevations above 1,067 meters (m) (3,500 feet (ft)) on the TNF.	Based upon its known range, this species is considered unlikely to occur on the Federal Parcel and will not be considered further in the BA/E.
Lowland leopard frog (<i>Rana yavapaiensis</i>)	TNF, S, WSCA	This species is known to occur on the TNF. In Arizona the species is found on the Colorado River near Yuma, and in west, central, and southeast Arizona, south of the Mogollon Rim. Lowland leopard frogs are habitat generalists, inhabiting and breeding in a variety of natural and man-made aquatic systems located in habitat ranging from desert grasslands to pinyon-juniper between 244 to 1,678 m (800-5,500 ft).	Based upon the known range of the species and the presence of aquatic habitats potentially suitable for this species within the Federal Parcel, this species may potentially occur on the Federal Parcel and requires further consideration and analysis in the BA/E.

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SPECIES	STATUS	KNOWN DISTRIBUTION AND HABITAT NEEDS	LIKELIHOOD OF OCCURANCE IN THE PROJECT AREA
Arizona toad (<i>Bufo microscaphus microscaphus</i>)	TNF, S	In Arizona this species is reorted to occur in east to west central Arizona, canyons and flood plains south of the Mogollon Rim, but also found in East Clear Creek. It has been reported from Apache, Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Navajo, and Yavapai counties. This species is known to occur on the TNF. Found in association with permanent pools, rocky streams and canyons, appearing to select for shallow water flowing over sandy or rocky bottoms; found in close proximity to unaltered, late serial riparian areas within desert grasslands, piñon-juniper, pine-oak, and ponderosa pine communities south of Mogollon Rim between 610-1,829 m (2,000-6,000 ft) elevation.	This species is unlikely to occur on the Federal Parcel. There are no perennial water resources on the Federal Parcel similar to those reportedly used by this species.

FEDERAL PARCEL SPECIAL-STATUS SPECIES SCREENING ANALYSIS

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SPECIES	STATUS	KNOWN DISTRIBUTION AND HABITAT NEEDS	LIKELIHOOD OF OCCURANCE IN THE PROJECT AREA
BIRDS			
Arizona Bell's vireo (<i>Vireo bellii</i>)	TNF, S, MIS	This species, which is currently a management indicator species in the TNF Plan, occurs between 457-1,067 m (1,500-3,500 ft) in riparian habitats.	This species may be transient throughout the area. Only a small portion of the Federal Parcel along Queen Creek contains riparian habitat that may be suitable for this species. These habitats are removed from areas of potential surface disturbance and it is not considered further in the BA/E. Should adverse impacts to water resources associated with mine development be anticipated, further analysis may be warranted at that time.
Bald eagle (<i>Haliaeetus leucocephalus</i>)	T, WSCA, MIS	This species is known to occur on the TNF. Bald eagles nest in tall trees, snags, or cliffs near water (reservoirs, rivers, and streams) with abundant prey. In Arizona, eagles are found along the larger river systems and near reservoirs that offer suitable nesting and foraging opportunities.	This species is not expected to occur on the Federal Parcel (though it may occasionally fly over) because of a lack of suitable foraging habitat. It is not considered further in this BA/E.

FEDERAL PARCEL SPECIAL-STATUS SPECIES SCREENING ANALYSIS

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SPECIES	STATUS	KNOWN DISTRIBUTION AND HABITAT NEEDS	LIKELIHOOD OF OCCURANCE IN THE PROJECT AREA
Cactus ferruginous pygmy-owl (<i>Glaucidium brasilianum cactorum</i>)	E, TNF, WC, H, CH	Habitats utilized by this species in Arizona are below 1,219 meters (4,000 ft) and according to Monson (<i>in</i> Glinski 1998), include “streamside cottonwoods and willows and adjacent mesquite bosques, usually with saguaros on nearby slopes. Less often it has been found along dry washes where large mesquite, paloverde, ironwood, and saguaro thrive.” The current known range of this species in AZ include deserts northwest of Tucson, extending southwest to the Altar Valley, Tohono O’ohdam Nation Lands and western deserts near Organ Pipe NM.	The Federal Parcel occurs at the extreme northeastern edge of the historic range of this species. Considering the current range of the species and the absence of any historic records in the project vicinity, this species is not considered further in this BA/E.
California brown pelican (<i>Pelicanus occidentalis californicus</i>)	E	Pelicans are coastal birds that inhabit near shore habitats such as beaches, estuaries, and near shore islands in Mexico and the United States. This species is sometimes dislocated by storms and transiently found on lakes and rivers in Arizona.	The Federal Parcel does not have suitable habitat for this coastal bird and it will not be considered further in this BA/E.

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Common blackhawk (<i>Buteogallus anthracinus</i>)	TNF, S, WSCA, MIS	This species is known to occur on the TNF. This raptor is associated with aquatic systems year-round in association with perennial streams with mature gallery forest with cottonwoods, willows and sycamore in the overstory.	This species is known to occur in the area. Common black hawks have been identified on the Federal Parcel by biologists engaged in field surveys in the spring of 2001 and 2003. It is considered further in this BA/E
Eared trogon (<i>Euptilotis neoxenus</i>)	TNF, S	This species is more typically found in the mountains of Mexico. In Arizona, it has been reported to occur rarely, primarily in the southeastern part of the state. It has been found in higher mountain canyons in pine forest habitats, mostly at elevations of from 6,000 to 10,000 ft msl.	Suitable habitats for this species do not occur on the Federal Parcel and it is not considered further in this BA/E.
Mexican spotted owl (<i>Strix occidentalis lucida</i>)	T, TNF, WSCA	This species is known to occur on the TNF. It nests in canyons and dense forests with multi-layered foliage structure. Elevation range for this species is between 1,250 to 2,600 m (4,100 to 9,000 ft).	Suitable habitat for this owl does not occur on or near the project area and it is not expected to occur on the Federal Parcel. This species is not considered further in this BA/E.
Northern goshawk (<i>Accipiter gentilis</i>)	TNF, S, WSCA, MIS	This species is known to occur on the TNF. Known habitat requirements for the goshawk consist primarily of ponderosa pine, mixed-species forest, and spruce-fir woodlands.	Suitable habitat for this species does not occur on the Federal Parcel. Goshawks are not expected to utilize the parcel for forage or nesting habitat and it is not considered further in this BA/E.

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SPECIES	STATUS	KNOWN DISTRIBUTION AND HABITAT NEEDS	LIKELIHOOD OF OCCURANCE IN THE PROJECT AREA
Northern gray hawk (<i>Asturina nitida maxima</i>)	TNF, S, WSCA	This species is known to occur on the TNF. The species is typically associated with riparian habitats found adjacent to permanent running water.	This species is unlikely to occur on the Federal Parcel. Transient gray hawks may fly over the area during migratory periods, but it is not expected to utilize habitats found within the Parcel. This species is not considered further in this BA/E.
Peregrine falcon (<i>Falco peregrinus anatum</i>)	TNF, S, WSCA	This species is known to occur on the TNF. The species is found on mountain cliffs and river gorges on open ledges; nests are often adjacent to watercourses and impoundments; hunting habitats include cropland, meadows, river bottoms, marshes, and lakes.	Suitable habitat for this species is found along the Apache Leap escarpment. This species is known to occur on the Federal Parcel and is considered in detail in this BA/E.
Southwestern willow flycatcher (<i>Empidonax traillii extimus</i>)	E, TNF, WSCA	This species is known to occur on the TNF, occurring in cottonwood/willow and tamarisk associations. This species ranges up to 2,590 meters (8,500 ft) in elevation.	This species is not expected to occur on the Federal Parcel and survey was not recommended. Dense stands of cottonwood/willow or other riparian vegetation that would support breeding or nesting of this species does not occur on or near the Federal Parcel and it is not considered further in this BA/E.

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Western snowy plover (<i>Charadrius alexandrinus nivosus</i>)	TNF, S, WCSA	This species is known to occur on the TNF, but only as a migrant. It forages on wet sands of beaches. It is also reported to occur on the Navajo Indian Reservation in northeastern Arizona.	This species may fly over the area during migratory periods. However, there is no suitable foraging or nesting habitat, such as sandy beaches, located on or near the project area and the species will not be considered further in this BA/E.
Western yellow-billed cuckoo (<i>Coccyzus americanus occidentalis</i>)	C, TNF, S, WCSA	This species is known to occur on the TNF. Records indicate that the species is found in association with perennial riparian habitats. Typically associated with dense broadleaf forest on the banks of streams, rivers, or lakes.	Riparian habitats within the Federal Parcel do not appear structurally similar to those habitats known to support this species. Further, the riparian habitat along Queen Creek is not expected to be impacted by surface disturbing activities. This species is not considered further in this BA/E.
Yuma clapper rail (<i>Rallus longirostris yumanensis</i>)	E, TNF, WCSA	Historically known to occur on the TNF. This elusive bird requires freshwater and brackish marshes with dense emergent wetland vegetation.	Suitable habitat for this species does not occur on the Federal Parcel and it is not considered further in this BA/E.

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FISH			
Bonytail chub (<i>Gila elegans</i>)	E, TNF, WSCA, H	Historically known to occur on the TNF. Primarily found in backwaters and eddies away from strong currents preferring waters with high levels of total dissolved solids. It also survives in lakes and ponds, including lakes Mohave and Havasu.	Suitable habitat for this species does not occur on the Federal Parcel and it will not be considered further in this BA/E.
Desert pupfish (<i>Cyprinodon macularius macularius</i>)	E, TNF, WSCA, H	There are no natural populations of this subspecies remaining in Arizona. Reintroduced populations exist at Cold Springs in Graham County, AD Wash in Maricopa County, and Finley Tank in Santa Cruz County. There are also nine refugia populations in private ponds and aquariums (AGFD 2001). Natural habitat for this small fish includes desert springs, small streams, and marshes. It can also tolerate warm saline water.	Considering the current range of the species and the nature of aquatic habitats on the Federal Parcel, this species is not expected to occur on the Federal Parcel and will not be considered further in this BA/E.
Gila chub (<i>Gila intermedia</i>)	PE, TNF, WSCA	This species is known to occur on the TNF. Typically occupies pools in small streams, marshes, cienegas, and other quiet waters, although it may have occurred in larger, more complex habitats. It occurs in Fish and Mineral Creeks on TNF.	This fish species does not occur on the Federal Parcel. There is no perennial surface water source that would provide habitat for this species. No fish were observed in stock tanks during biological inventory of the Parcel.

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SPECIES	STATUS	KNOWN DISTRIBUTION AND HABITAT NEEDS	LIKELIHOOD OF OCCURANCE IN THE PROJECT AREA
Gila topminnow (<i>Poeciliopsis occidentalis occidentalis</i>)	E, TNF, WSCA	This species is known to occur on the TNF. The topminnow requires small streams, or cienegas with vegetated shallows at elevations below 1,371 m (4,500 ft). It prefers shallow, warm and fairly quiet waters but will adjust to a wide range, living in quiet to moderate currents, depths to 1 m (3 ft), and water temperatures from constant 26.7°C (80°F) springs to streams fluctuating from 6.1-37.2°C (43-99°F).	Stock tanks on the Parcel do not appear to provide suitable habitat for this species. During field visits, no fish were observed in the stock tanks and this species is not considered further in this BA/E.
Loach minnow (<i>Tiaroga cobitis</i>)	T, TNF, WSCA, H, CH	Historically known to occur on the TNF. Habitat requirements for this aquatic species include large flowing streams with swift shallows, cobble substrate, and dynamic hydrography.	This fish species does not occur on or near the Federal Parcel. Ephemeral and perennial stock tanks on the site are not suitable for this minnow and the intermittent stream habitat in Queen Creek is also unsuitable. This species will not be considered further.

FEDERAL PARCEL SPECIAL-STATUS SPECIES SCREENING ANALYSIS

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SPECIES	STATUS	KNOWN DISTRIBUTION AND HABITAT NEEDS	LIKELIHOOD OF OCCURANCE IN THE PROJECT AREA
Longfin dace (<i>Agosia chrysogaster</i>)	TNF	This species is known to occur on the TNF. Usually found in waters less than 0.2 m (0.6 ft) deep, with moderate velocities over pebble/gravel/sand substrate; during desiccating conditions, individuals persist beneath moist debris and algal mats throughout the day and become active at night when meager flows return.	Suitable habitat for this species does not occur on the Federal Parcel and it will not be considered further in this BA/E
Sonora sucker (<i>Catostomus insignis</i>)	TNF	This species is known to occur on the TNF. Characteristic of gravelly or rocky pools of creeks and rivers in a variety of habitats from warm rivers to trout streams. Individuals are sedentary, exhibiting little seasonal movement and resisting downstream displacement during floods.	Suitable habitat for this species does not occur on the Federal Parcel and it will not be considered further in this BA/E
Speckled dace (<i>Rhinichthys osculus</i>)	TNF	This species is known to occur on the TNF. This dace is a bottom dwelling species that lives in shallow, rocky, headwater streams with relatively swift flow, sometimes in areas with considerable aquatic vegetation and in riffles that are about 0.2 m (0.5 ft) deep.	Suitable habitat for this species does not occur on the Federal Parcel and it will not be considered further in this BA/E

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Desert sucker (<i>Catostomus clarki</i>)	TNF	This species is known to occur on the TNF. Found in rapids and flowing pools of streams, primarily over bottoms of gravel-rubble with sandy silt in the interstices; adults live in pools, moving at night to swift riffles and runs.	Suitable habitat for this species does not occur on the Federal Parcel and it will not be considered further in this BA/E
Roundtail chub (<i>Gila robusta</i>)	TNF, S, WSCA	This species is known to occur on the TNF. It occupies cool to warm water, mid-elevation streams and rivers where typical adult microhabitat consists of pools 2.4 m (8 ft) deep adjacent to swifter riffles and runs. Cover is usually present as large boulders, tree rootwads, submerged large trees and branches, undercut cliff walls, or deep water.	Suitable habitat for this species does not occur on the Federal Parcel and it will not be considered further in this BA/E
Spikedace (<i>Meda fulgida</i>)	T, TNF, WSCA, CH, H	Historically known to occur on the TNF. It occupies midwater habitats of runs, pools, and swirling eddies that are typically less than 0.4 m (1 ft) deep.	Suitable habitat for this species does not occur on the Federal Parcel and it will not be considered further in this BA/E.

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Razorback sucker (<i>Xyrauchen texanus</i>)	E, TNF, WSCA, CH	This species is known to occur on the TNF. It tends to occupy strong, uniform currents over sandy bottoms, eddies, and backwaters lateral to river channels and sometimes concentrating in deep places near cut banks and fallen trees.	Suitable habitat for this species does not occur on the Federal Parcel and it will not be considered further in this BA/E.
Loach minnow (<i>Tiaroga cobitus</i>)	T, TNF, WSCA, CH	Historically known to occur on the TNF. It inhabits turbulent, rocky riffles or mainstream rivers and tributaries up to about 2,195 m (7,200 ft) elevation; it typically occupies interstices of cobble-size substrate occasionally with dense growths of filamentous algae.	Suitable habitat for this species does not occur on the Federal Parcel and it will not be considered further in this BA/E.
Colorado pikeminnow (<i>Ptychocheilus lucius</i>)	E, TNF, WSCA, ENE	This species is known to occur on the TNF. Habitat includes turbid, deep, and strongly flowing water. Small individuals occupy shallow backwater areas with little or no current and sand/silt substrates. During flood events this species may occupy flooded bottomlands adjacent to rivers.	Suitable habitat for this species does not occur on the Federal Parcel and it will not be considered further in this BA/E.

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Gila trout (<i>Oncorhynchus gilae</i>)	E, TNF, WSCA	This species is known to occur on the TNF. It occurs in small headwater streams on the TNF where water temperatures seldom exceed 21°C (70°F).	Suitable habitat for this species does not occur on the Federal Parcel and it will not be considered further in this BA/E.
Woundfin (<i>Plagopterus argentissimus</i>)	E, TNF, WSCA, ENE	Historically known to occur on the TNF. This riverine species is often found adjacent to riffles in runs and quiet waters over sand or sand/gravel substrates.	Suitable habitat for this species does not occur on the Federal Parcel and it will not be considered further in this BA/E.
Headwater chub (<i>Gila nigra</i>)	TNF	This species is known to occur on the TNF. It is restricted to the Gila River basin, in middle to headwater reaches of middle-sized streams. It prefers pools associated with cover such as deep places near obstructions, large pools, or undercut banks, and can be found in Tonto Creek and tributaries.	Suitable habitat for this species does not occur on the Federal Parcel and it will not be considered further in this BA/E.
Flannelmouth sucker (<i>Catostomus latipinnis</i>)	TNF, S	This species is known to occur on the TNF. It is generally found in medium to large, strongly flowing rivers with gravel, rocks, sand, or mud bottom.	Suitable habitat for this species does not occur on the Federal Parcel and it will not be considered further in this BA/E.

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INVERTEBRATES			
Obsolete Viceroy butterfly (<i>Limenitis archippus obsoleta</i>)	TNF, S	This species is known to occur on the TNF. The species is widespread and obligate to cottonwood-willow riparian areas. This subspecies is known only to feed on Salix in the Coronado NF (such as around Patagonia Lake). It is reported by AGFD to be primarily found along major watercourses in dense stands of willow.	Potentially suitable habitat for this species (stands of Salix) is very limited within the Federal Parcel. While it may occur in these areas, none could be classified as major watercourses with dense stands of Salix as described in AGFD abstracts. This species will not be discussed further in this BA/E.
Evansi brigadier (Huachuca giant skipper) (<i>Agathymus evansi</i>)	TNF, S	This species inhabits open woodlands and arid canyon lands in southeastern Arizona. There are no known occurrences in TNF but the host plant (<i>Agave parryi</i>) is listed as occurring in Tonto. Only known from the Huachuca Mountains and vicinity in southern Arizona. The elevation range for this species is 1,707-1,768 m (5,600 – 5,800 ft).	The Federal Parcel occurs outside of the known range of this species in Arizona and it is not considered likely to occur. This species will not be considered further in this BA/E

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Neumogen's giant skipper (<i>Agathymus neumoegeni</i>)	TNF, S	This species is most commonly found in upper Sonoran habitat, though sometimes in lower transition zones. Host plants are agave. Host plants used by this species are <i>A. parryi</i> , and probably <i>A. lechuguilla</i> .	Giant Skippers have been observed in the canyons adjacent to the Federal Parcel, though it is unclear if these are Neumogens' or not. The two agave species reported to be utilized by this species of butterfly as a host plant are not known to occur on the subject parcel. Therefore, this species is not considered further in this BA/E.
Comstock's hairstreak or Desert green hairstreak (<i>Callophrys comstocki</i>)	TNF, S	The species favors dry rocky areas and piñon-juniper woodland of foothills and canyons of the upper Sonoran mountain plateaus between 1,524-1,829 m (5,000-6,000 ft) elevation. Host plants for this butterfly are a variety of <i>Eriogonum</i> . The reported range for this species is the eastern portion of the upper Sonoran Zone in desert canyons.	This project is outside of the published range for this species and it will not be considered further in this BA/E.
Arizona copper (<i>Lycaena ferrisi</i>)	TNF, S	This species inhabits open meadows in the eastern part of Arizona. Catepillars of this species feed primarily on various species of dock (<i>Rumex</i> spp). It has been documented in the White Mountains but not in TNF.	This species is restricted to the White Mountains of Arizona and New Mexico and appears to occur at elevations higher than those found on the Federal Parcel. It will not be considered further in this BA/E.

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Spotted skipperling (<i>Piruna polingii</i>)	TNF, S	This species inhabits moist woodland openings with lush vegetation, stream sides, ravines, and meadows in low to mid-elevations. It takes nectar along cool, deep canyons and along forested road margins.	Suitable habitat for this species does not occur on the Federal Parcel and it will not be considered further in this BA/E.
Arizona snaketail dragonfly (<i>Ophiogomphus arizonicus</i>)	TNF, S	The species is closely associated with stream habitats; perennial water is necessary since the fully aquatic naiads require more than one season to mature.	The Federal Parcel does not contain habitat suitable for this species. Potentially perennial waters sources within the parcel are restricted to the largest of the cattle tanks. Queen Creek is intermittent and thus would not support the full life cycle of this species. It will not be considered further in this analysis.
Hoary skimmer dragonfly (<i>Libelula nodisticta</i>)	TNF, S	This species is usually associated with ponds, marshes, or still water segments of streams with emergent vegetation. Naiads are fully aquatic and adults are totally riparian dependent.	Emergent vegetation associated with water resources on the property is limited to sedges along the shore line of the perennial cattle tank found on the parcel. Impacts to this tank and adjacent habitats are not expected and this species will not be considered further in this BA/E. Should, at some point in the future impacts be planned in this area, more detailed analysis is recommended.

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Maricopa tiger beetle (<i>Cicindela oregona maricopa</i>)	TNF, S	This species is known to occur on the Tonto. It has been collected from several different habitats within its range, mostly on sandy stream banks and less commonly on gravels and clays along streambanks. It is reported to have the potential to occur near seeps and reservoirs. Substrate suitable for larval stages is a major factor determining local abundance. Required substrates appear to be a sand silt material capable of holding together to form a burrow and capable of retaining sufficient moisture to prevent larval desiccation.	Substrates associated with the stock ponds/reservoirs at the Federal Parcel tend to be sandy silts and may be considered suitable for this species. Species-specific surveys were not conducted and its presence is not known. Because these tanks are not expected to be adversely impacted, more detailed discussion of this species is not provided in this BA/E. Should future project plans anticipate impacts to this tank, additional evaluation is recommended.
Tiger beetle or Cow path tiger beetle (<i>Cicindela purpurea cimarrona</i>)	TNF, S	This species is a dispersed high elevation grassland and prairie species in Arizona, though it inhabits lower elevations elsewhere. This species appears to prefer clay soils though many of the Arizona records are from higher elevation sites with volcanic dust and cinders.	The Federal Parcel does not contain habitat suitable for this species and it is not expected to occur on the parcel. This species is not considered further in this BA/E.
Hairy-necked tiger beetle (<i>Cicindela hirticollis corpuscula</i>)	TNF, S	In the southwestern U.S. the species is known to occur in sandy habitats far from water (such as sand dunes and sand pits).	This species does not occur on the Federal Parcel. No sand dunes are located on the Parcel.

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Tiger beetle (<i>Cicindela praetextata pallidofemora</i>)	TNF, S	The species occurs mainly on dry soils of upper beaches and playas and is primarily a lakeshore species.	The Federal Parcel does not appear to contain habitat suitable for this species. The ephemeral stock tanks do not provide lakeshore habitat.
Netwing midge (<i>Agathon arizonicus</i>)	TNF, S	This species is known to occur on the TNF. It requires swift-moving streams typically with waterfalls that support larvae. Adults do not leave the riparian corridors. The only known TNF site is at Workman Creek.	This species does not occur on the Federal Parcel. The Federal Parcel does not contain aquatic habitat required for this species.
Parker's cyloepus riffle beetle (<i>Cylloepus parkeri</i>)	TNF, S	This species is known to occur on the TNF. It is associated with stream riffles and is only known from Roundtree Canyon on the TNF.	The Federal Parcel does not contain habitat suitable for this species. There are no permanent streams on the Federal Parcel.
Fossil springsnail (<i>Pyrgulopsis simplex</i>)	TNF, S	This species is known to occur on the TNF. Habitat requirements are not well understood, but the Genus is typically found on rock or aquatic macrophytes in moderate current. The species is restricted to a number of springs, including Fossil Springs, that form the perennial portion of Fossil Creek (Gila and Yavapai Counties), which flows into the Verde River south of Childs, Arizona.	The Federal Parcel does not contain habitat suitable for this species. This species is restricted to the Fossil Creek drainage. It will not be discussed further in this BA/E.

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SPECIES	STATUS	KNOWN DISTRIBUTION AND HABITAT NEEDS	LIKELIHOOD OF OCCURANCE IN THE PROJECT AREA
MAMMALS			
Allen's big-eared bat <i>(Idionycteris phyllotis)</i>	TNF, HP	This species is known to occur on the TNF. It is typically associated with mountainous areas from the southern Colorado Plateau, the Mogollon Rim and adjacent mountain ranges. Habitat consists of ponderosa pine, pinyon-juniper, Mexican woodland, and riparian areas with sycamores, cottonwoods, and willows. It has mostly been collected in proximity to boulder piles, cliffs, rocky outcrops, or lava flows, often above water. Elevation range for this species is between 403 to 3,225 m (1,320 to 9,800 ft).	Little is known about this species though it may occur in proximity to or on the Federal Parcel. It is considered in greater detail in this BA/E.
California leaf-nosed bat <i>(Macrotus californicus)</i>	TNF, HP, WSCA	This species is known to occur on the TNF. Colonies of this species were identified in 1916 and 1960 in the Mazatzal Mountains on the Tonto Basin Ranger District. Another colony was reported near Seven Mile Wash on the Globe Ranger District. Primary habitat for this species includes Sonoran and Mohave desertscrub and roosts are typically located in mines and caves.	The parcel contains potentially suitable roost sites along the west face of the Apache Leap escarpment and suitable forage habitat. BCI did not collect any individuals of this species during their 1997 investigations. This species is considered in more detail this BA/E.

FEDERAL PARCEL SPECIAL-STATUS SPECIES SCREENING ANALYSIS

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Desert bighorn sheep (<i>Ovis canadensis mexicana</i>)	TNF, S	This species is known to occur on the TNF. The best habitat for this species is found between 914-1,219 m (3,000-4,000 ft) in jojoba communities with galleta as the dominant grass	The Federal Parcel does not contain does not contain suitable habitat for this species. Any planned activities within the parcel would not preclude movement of this species between the populations and it will not be considered further in this BA/E.
Lesser long-nosed bat (<i>Leptonycteris curasoae yerbabuena</i>)	E, TNF, WSCA	This species typically occupies desertscrub habitat with agave and columnar cacti present as food plants. It occurs below 1,828 meters (6,000 ft). Known maternity and roost sites for LLNB are located in Southern Arizona >145 km (90 miles) from the site.	While this species is generally considered unlikely to occur on the Federal Parcel based on its known distribution, the proximity of the parcel to the limits of the species late range in Arizona warrants further consideration in this BA/E.
Southwestern river otter (<i>Lutra canadensis sonora</i>)	TNF, S, WSCA	Historically known to occur on the TNF. This species requires permanent flowing water or ponds, overhanging bank vegetation, and haul-out sites suitable for leaving and entering the water. Forage includes amphibians, fish, small mammals, and crayfish.	This species does not occur on the Federal Parcel. There are no flowing rivers or other suitable aquatic habitat for this species on the parcel

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Spotted bat <i>(Euderma maculatum)</i>	TNF, WSCA, HP	Historically, this bat was widely distributed throughout the western United States, northern Mexico, and into Canada. Habitat requirements are not well documented, as these bats appear to roost singly in cracks and crevices on rocky cliffs near surface water. Forage consists of a variety of insects such as moths, beetles, and grasshoppers.	The Federal Parcel contains potentially suitable roost and foraging habitat though the majority of sightings in Arizona have occurred in the western and northeastern portion of the state. It is considered in more detail in the BA/E.
Townsend's big-eared bat <i>(Corynorhinus townsendii)</i>	TNF, HP	This species is known to occur on the TNF. This species ranges throughout western North America down to southern Mexico. In Arizona this bat prefers caves and old mine workings, and populations concentrations have been located around substantial areas of cavity forming rocks in old mining districts. Elevation range is from 366 to 1,707 m (1,200 to 5,600 ft), but it is generally found around 914 m (3,000 ft).	This bat potentially occurs on the Federal Parcel or nearby lands. Several sitings have been reported in the Sierra Anchas on the Tonto Basin Ranger District. Nearby mining districts in Superior and Globe provide numerous mineshafts and adits that may be utilized by this species. It is considered in more detail in this BA/E.

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Western red bat (<i>Lasiurus blossevillii</i>)	TNF, WSCA, HP, H	Poorly known in Arizona, this species appears to be a summer resident only, occurring primarily along riparian corridors in the central and southeastern part of the state. In Arizona, the western red bat has been collected over ponds or along waterways among oaks, sycamores, and walnuts in the Huachuca and Graham Mountains, among cottonwoods along Bright Angel Creek near the Colorado River, and within the pine-fir forest of the Sierra Anchas. It typically roosts singly in the foliage of broad-leaved trees.	This species is historically known from the TNF, but may potentially be transient through portions of the Federal Parcel. Only a small portion of the Federal Parcel along Queen Creek contains broad-leaved riparian and wooded habitat that may be suitable for this species. These habitats are removed from areas of potential surface disturbance and the species is not considered further in the BA/E. Should adverse impacts to water resources associated with mine development be anticipated, further analysis may be warranted at that time.
PLANTS			
Acuña cactus (<i>Echinomastus erectocentrus</i> var. <i>acunensis</i>)	C	This species is found on well-drained soils of knolls and gravel ridges in Sonoran desertscrub at elevations between 396 and 610 m (1,300 to 2,000 ft). The closest known population is NE of Florence, ca 16 to 32 km (10 to 20 miles) southwest of the Federal Parcel.	Acuña cacti do not occur on the Federal Parcel, which is greater than 610 m (2,000 ft) above mean sea level. This species is not considered further in this BA/E

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Alamos deer vetch (<i>Lotus alamosanus</i>)	TNF, S	This species is known to occur on the TNF. It is a wetland obligate and semi-aquatic, requiring a perennial water source and forming mats, clumps, or carpets and is restricted to stream banks in canyons between 1,067-1,676 m (3,500-5,500 ft) elevation.	Aquatic habitats similar to that described for this species do not occur on the Federal Parcel and it is not considered further in this BA/E.
Aravaipa sage (<i>Salvia amissa</i>)	TNF, S	This species is known to occur on the TNF. It is found on gravel, sand and silt substrates of upper floodplain terraces in shady canyon bottoms near streams with oak woodland or deciduous riparian woodlands with mature sycamore, ash and walnut, and mesquite between 455-1,525 m (1,500-5,000 ft) in elevation. It is known from Devils Chasm in the Sierra Ancha Mountains.	The Federal Parcel does not support habitat suitable for this species. There are no floodplain terraces or shady canyon bottoms on the Parcel. This species will not be discussed further in this BA/E.

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Arizona agave (<i>Agave arizonica</i>)	E, TNF	This species is known to occur on the TNF. This plant occupies mesas and slopes in Interior Chaparral, Desert Grassland, and the transition zone between grassland and piñon-juniper on shallow, rocky soils derived from granite, schist, gneiss, quartzite, tuff, and limestone between 914–1,829 m (3,000– 6,000 ft) elevation. The flower stalk of this species is very distinct and remains intact for several years.	This species is a hybrid between <i>A. chrysantha</i> and <i>A. toumeyana</i> . <i>A. chrysantha</i> is known to commonly occur on the parcel and <i>A. toumeyana</i> occurs in isolated patches near the parcel. The potential for hybridization of these species exists. No Arizona agave were observed on the Federal Parcel during general field investigations. Additional evaluation is not provided in this BA/E.
Arizona alum root (<i>Heuchera glomerulata</i>)	TNF, S	This species is known to occur on the TNF. This perennial herb is found on north-facing shaded rocky slopes near seeps, springs, and riparian areas (often in humus soil). It is typically associated with oak and pine woodland, ponderosa pine, and mixed conifer vegetative communities between 1,219-2,743 m (4,000-9,000 ft) elevation.	Habitat and substrate on the Federal Parcel is dissimilar to the species requirements and it is not expected to occur in the project area. Additional analysis of this species is not provided in this BA/E.

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Arizona bugbane (<i>Cimicifuga arizonica</i>)	TNF, S	The species is found in moist loamy soil in riparian deciduous forest between 1,828-2,530 m (6,000-8,300 ft) elevation	This species does not occur on the Federal Parcel. There is no riparian forest and the elevation range within the Parcel is below the known range for this species. It is not considered further in this analysis.
Arizona cliffrose (<i>Purshia subintegra</i>)	E, TNF	This species is known to occur on the TNF. The species prefers rolling limestone hills within Sonoran desertscrub, usually on white Tertiary (Miocene and Pliocene) lakebed deposits high in lithium, nitrates, and magnesium from 762 to 1,220 m (2,500-4,000 ft) elevation.	Arizona cliffrose does not occur on the Federal Parcel. Rock formations on the site are primarily composed of Apache Leap tuff (dacite) material with some limestone formations on the west side of the Apache Leap escarpment. Suitable habitat for this species is not found on the property and it will not be considered further in this analysis.
Arizona giant sedge (<i>Carex ultra</i> Bailey) aka <i>Carex spissa</i> var. <i>ultra</i>	TNF, S	This species is associated with saturated soils near or in perennial seeps, streams, and springs from 760-1,830 m (2,500-6,000 feet) elevation.	This species was not observed during field work. A low growing sedge occurs adjacent to the perennial cattle tank but it is not this species. Habitats along Queen Creek within the parcel do not appear suitable. It is not expected to occur and is not considered further in this BA/E.

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Arizona hedgehog cactus <i>(Echinocereus triglochidiatus var. arizonicus)</i>	E, TNF	This species is known to occur on the TNF in Gila and Pinal Counties from 1,130 to 1,615 meters (3,700 to 5,300 ft) elevation, within the transition between Interior chaparral and Madrean evergreen woodland. This cactus is found on open slopes of rugged steep-walled canyons, granite boulder-pile ridges and slopes in Arizona desert grassland between 1,006 and 1,737 m (3,300–5,700 ft) elevation. Its preferred habitat is found on parent materials of igneous origin, primarily Schultze granite and Apache Leap Tuff (dacite).	ETA is known to occur on the Federal Parcel and is considered in greater detail in the BA/E.
Arizona phlox <i>(Phlox amabilis)</i>	TNF, S	The species is endemic to central Arizona and is known to occur near Prescott and Payson, Arizona. The known locality in the Tonto NF is an opening in a ponderosa pine forest	This species does not occur on the Federal Parcel. There is no suitable habitat comprised of Ponderosa pine forest on the Parcel. It is not expected to occur and is not considered further in this BA/E.

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Blumer's dock (<i>Rumex orthoneurus</i>)	TNF, S	This species is known to occur on the TNF. The species is a southwest endemic in high elevation riparian and cienega habitats in moist loamy soils or shallowly inundated areas between 1,983 and 2,810 m (6,500 and 9,200 ft) elevation.	This species does not occur within this portion of the TNF. There are is no high elevation wetland or suitable riparian habitat on the Federal Parcel. In addition, the Federal Parcel is outside the known elevation range of the species.
Chihuahua sedge (<i>Carex chihuahuaensis</i>)	TNF, S	This species is known to occur on the TNF. The species typically occupies north and northwest-facing slopes in wet soils in streambeds, wet meadows, cienegas, marshy areas, shallower draws in pine-oak forest and riparian woodland between 335 and 2,438 m (1,100 and 8,000 ft) elevation.	There is a low probability or occurrence of this species; it is known from Reynold's Creek in the Sierra Ancha Mountains. This project area appears to be outside the known distribution of this species. A field check of seeps and springs during the flowering season (Apr.-Aug.) would confirm that the sedge on the property is not this species. It is not considered in further detail in this BA/E.
Eastwood alum root (<i>Heuchera eastwoodiae</i>)	TNF, S	This species is known to occur on the TNF. This perennial herb is found only in central Arizona on moist slopes in ponderosa pine forests and canyons between 1,524 and 2,438 m (5,000 and 8,000 ft) elevation.	Given its known habitat requirements, this species is unlikely to occur on the Federal Parcel. No members of this genus were observed during field investigations. This species is not considered further in this analysis.

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SPECIES	STATUS	KNOWN DISTRIBUTION AND HABITAT NEEDS	LIKELIHOOD OF OCCURANCE IN THE PROJECT AREA
Fish Creek rock daisy (<i>Perityle saxicola</i>)	TNF, S	This species is known to occur on the TNF. The species grows from cracks and crevices on cliff faces, large boulders, and rocky outcrops in canyons and on buttes composed of Barnes conglomerate and Mescal limestone in very xeric east and northeast exposures in Sonoran desertscrub between 610 and 1,067 m (2,000 and 3,500 ft) elevation.	The Federal Parcel does not contain habitat suitable for this species. It is not considered further in this analysis.
Fish Creek fleabane (<i>Erigeron piscaticus</i>)	TNF, S	This species is known to occur on the TNF. The species is found on upper floodplain terraces in moist, shady canyon bottoms, growing in sand/silt alluvium under mature walnut, alder, and hackberry between 685 and 1,070 m (2,250 and 3,500 ft) elevation. The historic distribution of the species is Fish Creek Canyon, Turkey Creek and Oak Grove canyons.	Suitable habitat for this species is not found within the portions of Queen Creek that traverse the Federal Parcel. It is not considered further in this analysis.
Flagstaff penstemon or Beardtongue (<i>Penstemon nudiflorus</i>)	TNF, S	This species is known to occur on the TNF. The species is found in dry Ponderosa pine forests in mountainous regions south of the Grand Canyon between 1,372 and 2,134 m (4,500 and 7,000 ft) elevation.	This species is unlikely to occur on the Federal Parcel. The Parcel does not contain habitat suitable for this species. There are no Ponderosa pine forests on the Parcel and it is not considered further in this analysis.

FEDERAL PARCEL SPECIAL-STATUS SPECIES SCREENING ANALYSIS

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SPECIES	STATUS	KNOWN DISTRIBUTION AND HABITAT NEEDS	LIKELIHOOD OF OCCURANCE IN THE PROJECT AREA
Gila rock daisy (<i>Perityle gilensis</i> var. <i>gilensis</i>)	TNF, S	This perennial grows on generally inaccessible cliff faces, ledges, and rock outcrops. The only known locality in the AGFD HDMS is near the face of the Mogollon Rim.	This plant appears to be restricted to the face of the Mogollon Rim area and it is not expected to occur on this parcel. This species is only known from the Coconino National Forest and it is not considered further in this BA/E.
Gila rock daisy (<i>Perityle gilensis</i> var. <i>salensis</i>)	TNF, S	The species is found near seeps on cliff faces, ledges, and rock outcrops between 914 and 1,219 m (3,000 and 4,000 ft) elevation. It is only known from the type locality on the San Carlos Indian Reservation on sandstone with a north-facing aspect on the Salt River between Showlow and Globe.	The Federal Parcel does not contain habitat suitable for this species. This plant is known only from the type locality between Showlow and Globe but TNF expects this species to occur along the Salt River as it passes through the Forest. The project is out of the known range of the species and it is not considered further.
Hohokam agave (<i>Agave murpheyi</i>)	TNF, S	This species is known to occur on the TNF. The species is usually found in close proximity to major drainage systems on open hilly slopes or alluvial terraces in desert scrub between 400 and 890 m (1,350 and 2,950 ft) elevation.	This species occurs below the elevation of the Federal Parcel and it is not expected to occur. No further analysis is provided in this BA/E.

FEDERAL PARCEL SPECIAL-STATUS SPECIES SCREENING ANALYSIS

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Mapleleaf false snapdragon (<i>Mabrya acerifolia</i>)	TNF, S	This species is known to occur on the TNF. The species is known only from south-central Arizona (type locality: Fish Creek Canyon) on shaded cliff and moist rock ledge habitats at about 619 m (2,000 ft) elevation.	This species occurs below the elevation of the Federal Parcel and it is not expected to occur. No further analysis is provided in this BA/E.
Mogollon fleabane (<i>Erigeron anchana</i>)	TNF, S	This species is known to occur on the TNF. The species is a central Arizona (Gila County) endemic that grows on various exposures on igneous and metamorphic granite cliff faces in chaparral through pine forests between 1,070 and 2,135 m (3,500 and 7,000 feet) elevation.	Suitable substrate is not found within the Federal Parcel and the species is not expected to occur. It is not considered further in this BA/E.
Mogollon thistle (<i>Cirsium parryi</i> spp. <i>Mogollonicum</i>)	TNF, S	The species is endemic to an approximate 2.6 square km (1 square mile) of Dane Spring Canyon on moist to very moist soils in riparian understory of perennial streams with ponderosa pine, Douglas fir, and white fir at 2,200 m (7,200 ft) elevation	The Federal Parcel is outside this species' highly restricted range near Dane Spring Canyon and it is not considered further in this BA/E.
Nichol Turk's head cactus (<i>Echinocactus horizonthalonius</i> var. <i>nicholii</i>)	E	Habitat is limited to formations containing alluvium and Horquilla material. The elevation range for this species is between 731 and 1,250 m (2,400 to 4,100 ft).	Suitable substrate for this species is not found on the Federal Parcel, and the Parcel is well outside the known distribution of this species. It is not considered further in this BA/E.

FEDERAL PARCEL SPECIAL-STATUS SPECIES SCREENING ANALYSIS

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Ripley wild buckwheat (<i>Eriogonum ripleyi</i>)	TNF, S	This species is known to occur on the TNF. The species grows in Tertiary lakebeds on well-drained powdery soils derived from limestone, sandstone, or volcanic tuffs and ashes between 610 and 1,830 m (2,000 and 6,000 feet) elevation	Suitable substrates for this species do not occur on the Federal Parcel and it is not expected to occur. This species is not considered further in this BA/E.
Sweet Cicely (<i>Osmorhiza brachypoda</i>)	TNF, S	This species is known to occur on the TNF. The only known location for the species is in Devils Chasm in the Sierra Ancha Mountains northeast of Phoenix, where it is found in moist canyons of coniferous forests from 1,219 to 2,286 m (4,000 to 7,500 ft) elevation.	Suitable habitat for this species is not found within the Federal Parcel. It is not considered further in this analysis.

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SPECIES	STATUS	KNOWN DISTRIBUTION AND HABITAT NEEDS	LIKELIHOOD OF OCCURANCE IN THE PROJECT AREA
Tonto Basin agave (<i>Agave delamateri</i>)	TNF, S	This species is known to occur on the TNF. The species is usually found in close proximity to major drainage systems on open hilly slopes in the Arizona upland subdivision of the Sonoran Desert between 725 and 1,554 m (2,350 and 5,100 ft) elevation. Less than 100 specimens are known to exist in the wild and all are in direct or indirect association with Mogollon or Salado (pre-Columbian) agricultural and settlement features, suggesting cultivation by pre-Columbian people.	All records of this species are reported from north of the Parcel and none are reported in Pinal County. This plant was not observed during field visits by botanists and it is not expected to occur on the Parcel. This species is not considered further in this BA/E.
REPTILES			
Sonoran desert tortoise (<i>Gopherus agassizii</i>)	TNF, S, WSCA	This species is known to occur on the TNF. Normal distribution is at elevations below 1,219 m (4,000 ft) in desert rocky foothills, lower bajadas and semi-desert grassland.	This species is known to occur within 3 miles of the Federal Parcel. Habitat on the western side of Apache Leap is favorable for this species. Tortoise scat was observed southwest of the Apache Leap outside of the Federal Parcel boundary during field surveys. More detailed analysis is provided in the BA/E.

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Arizona night lizard (<i>Xantusia vigilis arizonae</i>)	TNF, S	This species is known to occur on the TNF. It is found along the southern edge of the Colorado Plateau on granite boulders with available crevice habitats. Recent BLM records have extended the range into the Superior/Globe region.	Potentially suitable habitat for this species occurs within the Federal Parcel and it is considered in greater detail in the BA/E.
Gila monster (<i>Heloderma suspectum</i>)	TNF	This species is known to occur on the TNF. This reptile is found in the Sonoran Desert and along the western edge of the Mohave Desert at an elevation of approximately 1,250 m (4,100 ft). Preferred habitat for this species is primarily associated with Arizona upland subdivision vegetation such as palo verde-saguaro scrub on hillsides, bajadas and canyon bottoms to creosote-bursage dominated flats. Within these habitats they are typically found in the wetter, rocky arroyos, which provide protection, moisture, and a concentrated prey base.	Gila monsters are highly likely to occur on the Federal Parcel. During spring 2003, a large adult Gila monster was observed in Devils Canyon east of the Federal Parcel. This species is considered in greater detail in the BA/E.

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Maricopa leafnose snake (<i>Phyllorhynchus browni lucidus</i>)	TNF, S	This species is known to occur on the TNF. Found in upland rocky or sandy desert dominated by desertscrub including mesquite, saltbush, creosote bush, saguaro and palo verde between 305 and 914 m (1,000 and 3,000 ft) elevation.	This species is unlikely to occur on the Federal Parcel. There is no suitable habitat and elevations within the Parcel are above the upper limit for this species. It is not considered in greater detail in this BA/E.
Mexican garter snake (<i>Thamnophis eques megalops</i>)	TNF, S, WCSA	This species is known to occur on the TNF. Associated with permanent streams, marshes, rich springs, and headwaters between 914 and 1,890 m (3,000 and 6,200 ft) elevation in riparian habitat associations which include pine and oak woodlands, mesquite grasslands, with cottonwood and willow occurrences.	This species is unlikely to occur on the Federal Parcel as there are no permanent streams or other potentially suitable habitat. It is not considered further in this analysis.
Narrow-headed garter snake (<i>Thamnophis rufipunctatus</i>)	TNF, S, WCSA	This species is known to occur on the TNF. It is restricted to aquatic habitat in montane and immediately adjacent regions between 914 and 2,438 m (3,000 and 8,000 ft) elevation. It generally occurs in shallow, swift-moving, rocky rivers and streams with headwaters along the Mogollon Rim.	Suitable habitat for this species does not occur on the Federal Parcel and it is not considered further in this analysis.