

# Ecological Overview

## Pinnacle Peak West Area Drainage Master Study

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# **I. Introduction**

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## **A. Purpose and Objectives**

This Ecological Overview (EO) has been prepared as part of the Area Drainage Master Study (ADMS) for the Pinnacle Peak West (PPW) study area in the northeast portion of Maricopa County, Arizona. The PPW ADMS has been commissioned by the Flood Control District of Maricopa County (FCDMC) to identify and evaluate flood hazards using various methods and data/information sources. The primary objectives of the ADMS are to (1) identify and characterize the existing and potential flooding hazards based on current conditions; (2) assess flooding hazard risks and categorize them for mitigation consideration; and (3) develop consensus and support from the public, stakeholders, and project partners on the study results. The PPW ADMS will use the Context Sensitive Flood Hazard Mitigation (CSFHM) planning and design approach to develop flood hazard mitigation concepts. The main premise of CSFHM is that flood hazard mitigation measures are acceptable to local communities, compatible with the environment, and effective in reducing flooding hazards.

This EO has been prepared to describe the natural environment in the study area, or the Land and Resource Context in CSFHM. It establishes baseline conditions and identifies potential constraints for analysis of environmental compatibility of flood hazard mitigation measures that may be developed based on this ADMS. Factors that describe the study area include:

- Location and landownership
- Topography, surface water hydrology, and soils
- Vegetation
- Land use

Within the Land and Resource Context in CSFHM, there are additional planning considerations related to the natural environment, including:

- Habitat for threatened, endangered, proposed, and candidate species
- Habitat for other special status species
- Wildlife linkages and wildlife habitat
- Special designation areas, including preserves and environmentally sensitive lands
- Waters of the United States

This EO describes the methods of analysis and information sources used to describe the natural environment and related planning considerations in the study area, summarizes the results of those analyses and queries, and broadly discusses implications for future flood hazard mitigation options based on the findings.

## II. Methods of Analysis

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### A. Records/Database Queries

There are a number of databases that provide records or information on various aspects of the natural environment, including several maintained by the U.S. Fish and Wildlife Service (USFWS) and the Arizona Game and Fish Department (AGFD). Databases accessed and queried for this study are summarized below. Data and records obtained are spatially displayed and analyzed using Geographic Information System (GIS) software.

#### 1. *USFWS Arizona Ecological Services Office*

The USFWS Arizona Ecological Services Office maintains a website (<http://www.fws.gov/southwest/es/arizona>) that provides lists of threatened, endangered, proposed, and candidate species for each county. It also provides information on their distribution and natural history, listing status and background, and past consultations under Section 7 of the Endangered Species Act (ESA). This website was accessed on November 28, 2012, and April 16, 2013, to obtain a list of threatened, endangered, and other special status species in Maricopa County. Information on habitat requirements and geographic range was reviewed for each species to determine potential occurrence in the study area.

#### 2. *Arizona's On-line Environmental Review Tool*

The AGFD Heritage Data Management System (HDMS) maintains a Web-based tool that provides records of special status species and mapped extent of designated or proposed critical habitat within a 3-mile radius of identified project or study areas (<http://www.azgfd.gov/hgis>). Special status species records include those for federally listed, proposed, or candidate species and other special status species, such as U.S. Forest Service and Bureau of Land Management sensitive species, Wildlife Species of Concern in Arizona, and some categories of protected native plants. This review tool identifies only known records, and the absence of records in a particular area does not necessarily indicate the absence of suitable habitat for a species of concern. In addition to special status species records, the output generated by this tool provides information on regulatory agencies that may need to be contacted and makes standard recommendations for mitigation measures based on the project type identified. This review tool was accessed by EcoPlan Associates, Inc., on October 1, 2012.

#### 3. *HabiMap™ Arizona*

HabiMap™ is a Web-based application developed and maintained by AGFD as an early planning tool for landscape-level analysis of natural resources (<http://www.habimap.org>).

This application provides mapping data for a number of resource types, including wildlife waters, Important Bird Areas, wildlife linkages, biotic communities, vegetation types, special status species distributions, and wildlife conservation potential. HabiMap™ was accessed by EcoPlan Associates, Inc., on September 12, 2012, to obtain data relevant to the study area.

#### 4. *USFWS National Wetlands Inventory*

The USFWS National Wetlands Inventory (NWI) provides the Web-based Wetlands Mapper tool (<http://www.fws.gov/wetlands/Data/Mapper.html>), which identifies wetlands, riparian areas, and wildlife refuges. NWI mapping of wetlands is based on interpretation of high-altitude aerial imagery, and wetlands are identified based on vegetation, visible hydrology, and geography. For this reason, NWI is of limited use in assessing the presence of smaller wetlands. The NWI Wetlands Mapper was accessed on September 12, 2012, to determine the potential presence of wetlands in the study area.

#### 5. *GIS and Other Data Sources*

GIS data used in the analysis were obtained from the FCDMC, the Arizona Land Resource Information System, the Arizona Geographic Applications for Planning Project developed by the University of Arizona, the AGFD, and the City of Scottsdale. Geodatabases or shape files were imported into our overall geodatabase for the EO to analyze spatial relationships of sensitive or unique natural resources or habitat features and to create graphics.

Other data sources include published reports and websites that address relevant natural resources in the study area. These sources are cited in the text and are included in Section V of this EO.

### B. Agency Contacts

Table 1 lists agencies and staff contacted to obtain existing information on the study area and immediate surroundings.

**Table 1. Agency Contacts**

Agency	Staff	Title	Information Obtained/Requested
AGFD, Main Office, Phoenix	Sabra Tonn	HDMS Program Supervisor	Location information for federally listed species and Wildlife Species of Concern in Arizona
AGFD, Main Office, Phoenix	Courtney Paul	HDMS Technician	Specific locality information for sensitive species in the study area
AGFD, Main Office, Phoenix	Amanda Borens	Wildlife/ GIS Specialist II	GIS data files/layers from HabiMap™
AGFD, Region VI Office, Mesa	Dana Warnecke	Habitat Specialist III	Digital files for wildlife linkages
Arizona State University, School of Mathematics and Natural Sciences	Brian Sullivan	Professor	Information on habitat for Sonoran Desert tortoise and Tucson shovel-nosed snake
FCDMC	Theresa Pinto	Project Manager	Contact information for Sonoran Desert tortoise research

### C. Field Review

Field reconnaissance was completed by a qualified EcoPlan Associates, Inc., biologist on July 3, 2012, and August 7, 2012, and was used to observe on-the-ground conditions, visit unique habitat features identified through database/records searches, take ground-level representative photos, and document dominant plant species composition in mapped vegetation types.

Information gathered during field reconnaissance was used to support and verify GIS mapping. Representative photos taken during the field review are included as the Appendix.

### **III. Results**

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#### **A. Study Area Description**

##### ***1. Location and Land Ownership***

The study area lies in northeast Paradise Valley in the Phoenix metropolitan area and includes portions of the cities of Phoenix, Scottsdale, Cave Creek, and Carefree (Figure 1). To the northeast, the study area encompasses drainages descending the alluvial bajada into Paradise Valley from the mountain ridgeline, separating it from the Verde River drainage to the east; it gathers flows emanating from southern portions of the New River Mountains to the north and the northern end of the McDowell Mountains to the east. The study area is bounded on the south by the Central Arizona Project (CAP) Canal and encompasses an area of about 95 square miles in Maricopa County.

The study area includes portions of the following townships from north to south:

- Township (T) 6 North (N), Range (R) 5 East (E), Sections 21–22, 27–29, and 31–35
- T5N, R3E, Sections 12–14, 23–26, and 34–36
- T5N, R4E, Sections 1–3 and 5–36
- T5N, R5E, Sections 2–11, 15–22, and 27–33
- T4N, R3E, Sections 1, 11–15, 23, and 24
- T4N, R4E, Sections 1–23, 26–30, and 33–35
- T3N, R4E, Sections 2 and 3

The study area is contained within the Cave Creek (1981), Curry's Corner (1982), McDowell Peak (1982), New River SE (1981), Union Hills (1981), and Wildcat Hill (1981) Arizona, U.S. Geological Survey 7.5-minute topographic series maps.

The study area contains private and public lands, including lands in the incorporated areas of Phoenix, Scottsdale, Cave Creek, and Carefree; State Trust lands administered by the Arizona State Land Department; lands administered by the Bureau of Reclamation and the U.S. Forest Service, and private lands in unincorporated portions of Maricopa County (Figure 2).

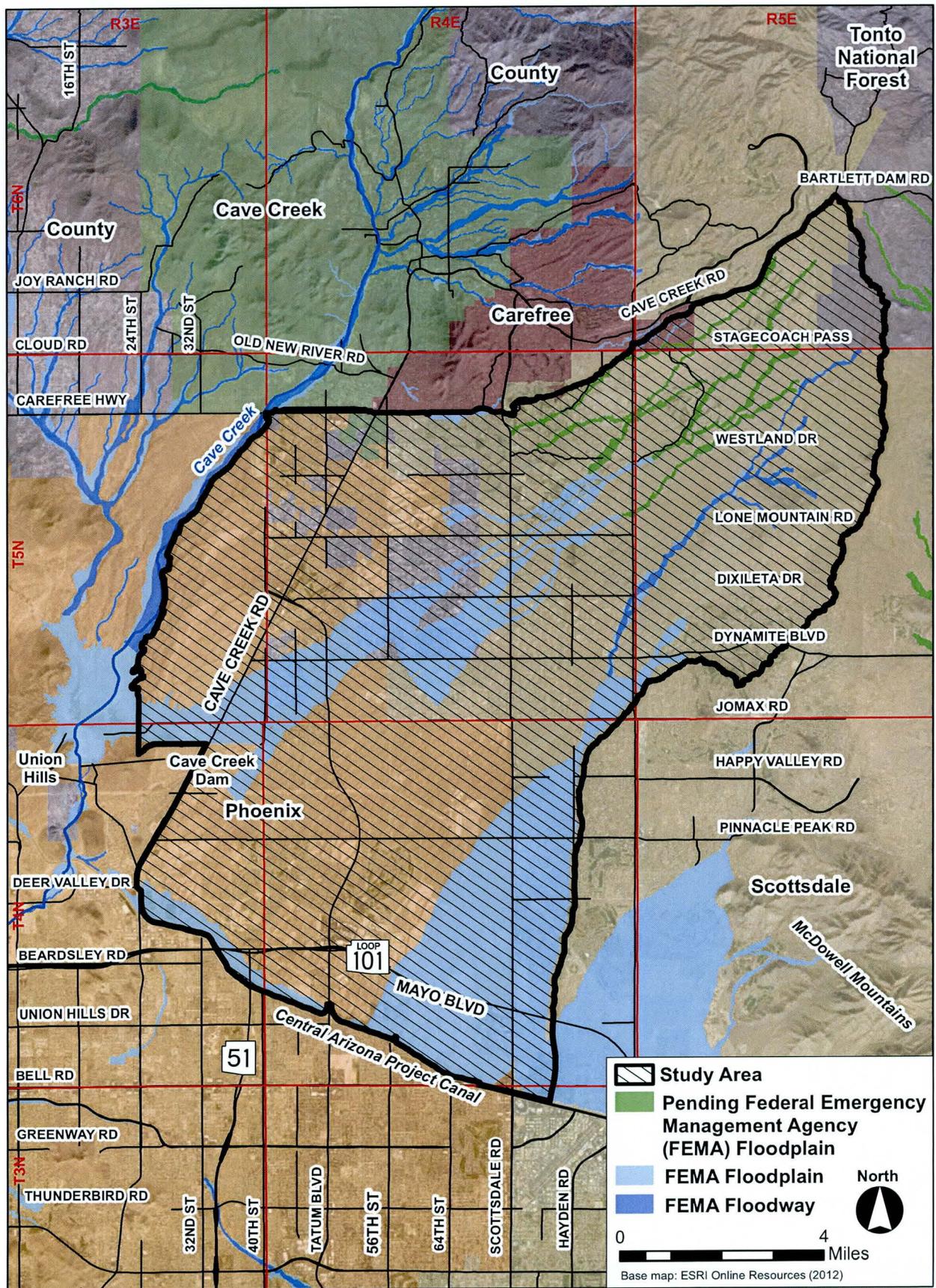


Figure 1. Study Area

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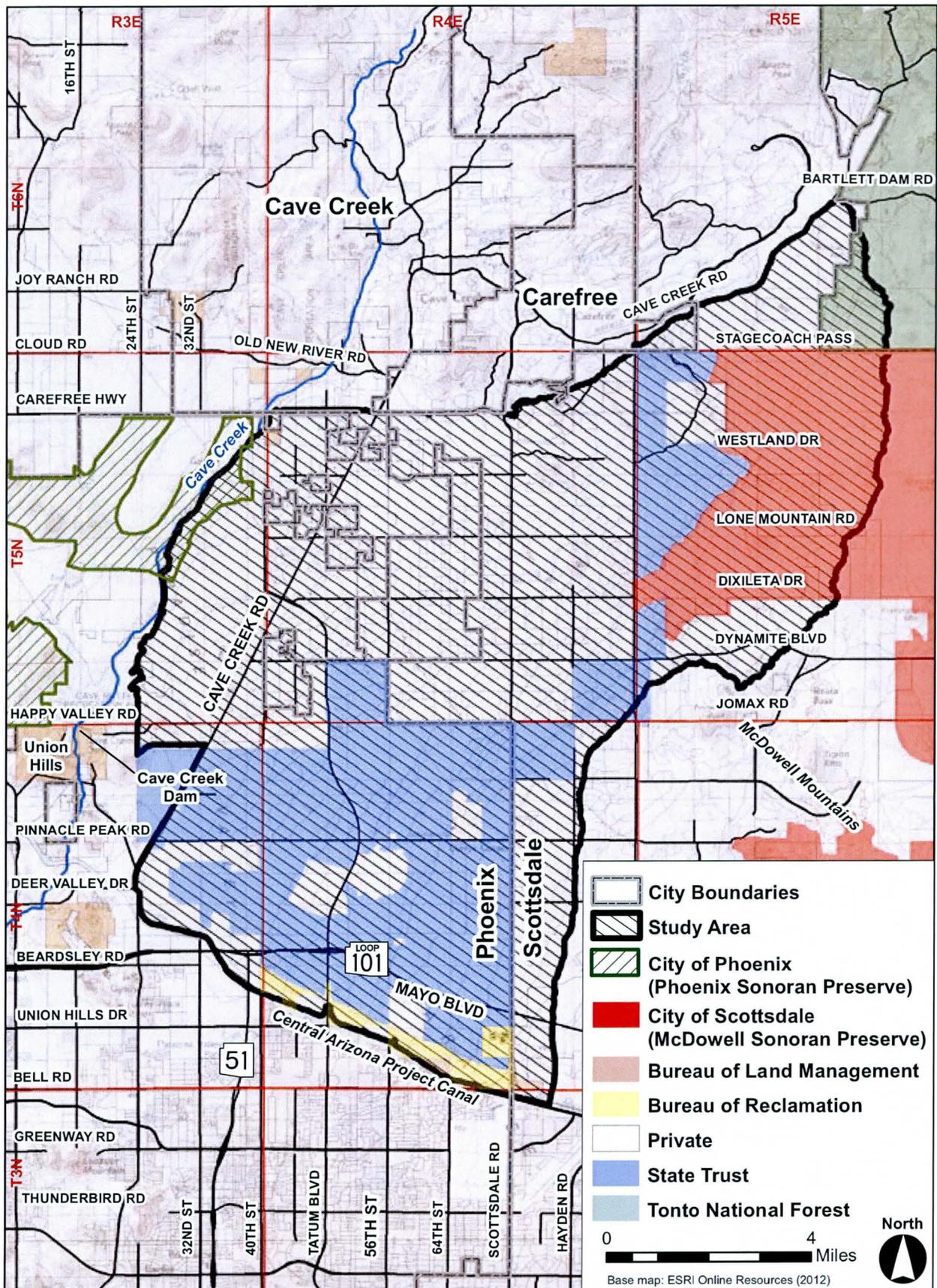


Figure 2. Landownership and Land Jurisdiction

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## 2. *Topography*

In the study area boundary, terrain generally descends from higher elevations in the northeast to the nearly flat, gently sloping terrain within Paradise Valley to the south and southwest. Other than hillsides associated with the Union Hills near the southwest end of the study area, the south and west portions of the study area consist of valley bottom with minor and more substantial, often braided desert washes. Cave Creek, forming the northwest edge of the study area, is a major ephemeral drainage that drains from the New River Mountains and continues southwest beyond the CAP Canal at the southwest corner of the study area. Along the northeast edge of Paradise Valley, three low desert peaks, one of which reaches an elevation of approximately 2,900 feet<sup>1</sup>, form an interrupted chain between Pinnacle Peak and the McDowell Mountains to the southeast and Black Mountain (approximately 3,400 feet) to the north. To the northeast of this discontinuous chain of desert peaks, terrain in the study area becomes more rolling as it ascends toward its northeast edge. Granite boulders, outcrops, and low rocky hills are a defining characteristic of this portion of the study area, which is dissected by well-defined desert washes and arroyos (Figure 3).

The northern edge of the study area follows the Carefree Highway east to Scottsdale Road, where it turns into North Tom Darlington Drive. From there, the boundary continues generally northeast to North Pima Road at Stagecoach Pass Road and then continues northeast to intersect and then follow East Cave Creek Road to its intersection with Bartlett Dam Road. This intersection is on the crest of a low divide between the Paradise Valley drainage to the west and the Verde River drainage to the east, representing the northernmost, and highest, elevation (3,280 feet) in the study area. To the south, the east edge of the study area follows the divide between the Verde River drainage to the east and the alluvial bajada descending southwest into Paradise Valley. The boundary follows the natural ridgeline south, then southwest, crossing Dynamite Boulevard northwest of Reata Pass and northeast of Pinnacle Peak (3,100 feet), an isolated northwest, outlying peak of the McDowell Mountains. The boundary then bends around Pinnacle Peak, trending southwest, then south, generally following the divide between unnamed drainages descending the alluvial plain within Paradise Valley, crossing one drainage near Pinnacle Peak Road and following the south end of another drainage to the southeast corner of the study area, at the CAP Canal.

In the west portion of the study area, the boundary follows Cave Creek to the south and southwest, from Carefree Highway to the north edge of the Union Hills and just east of Cave Creek Dam. From here, the boundary turns east to North Cave Creek Road. The boundary then follows North Cave Creek Road southwest to its crossing with the CAP Canal. From here, the southern study area boundary follows the CAP Canal east and southeast at approximately 1,500 feet elevation to the southeast corner of the study area midway between Hayden and Scottsdale roads.

<sup>1</sup> Elevations in this document are referenced to mean sea level.

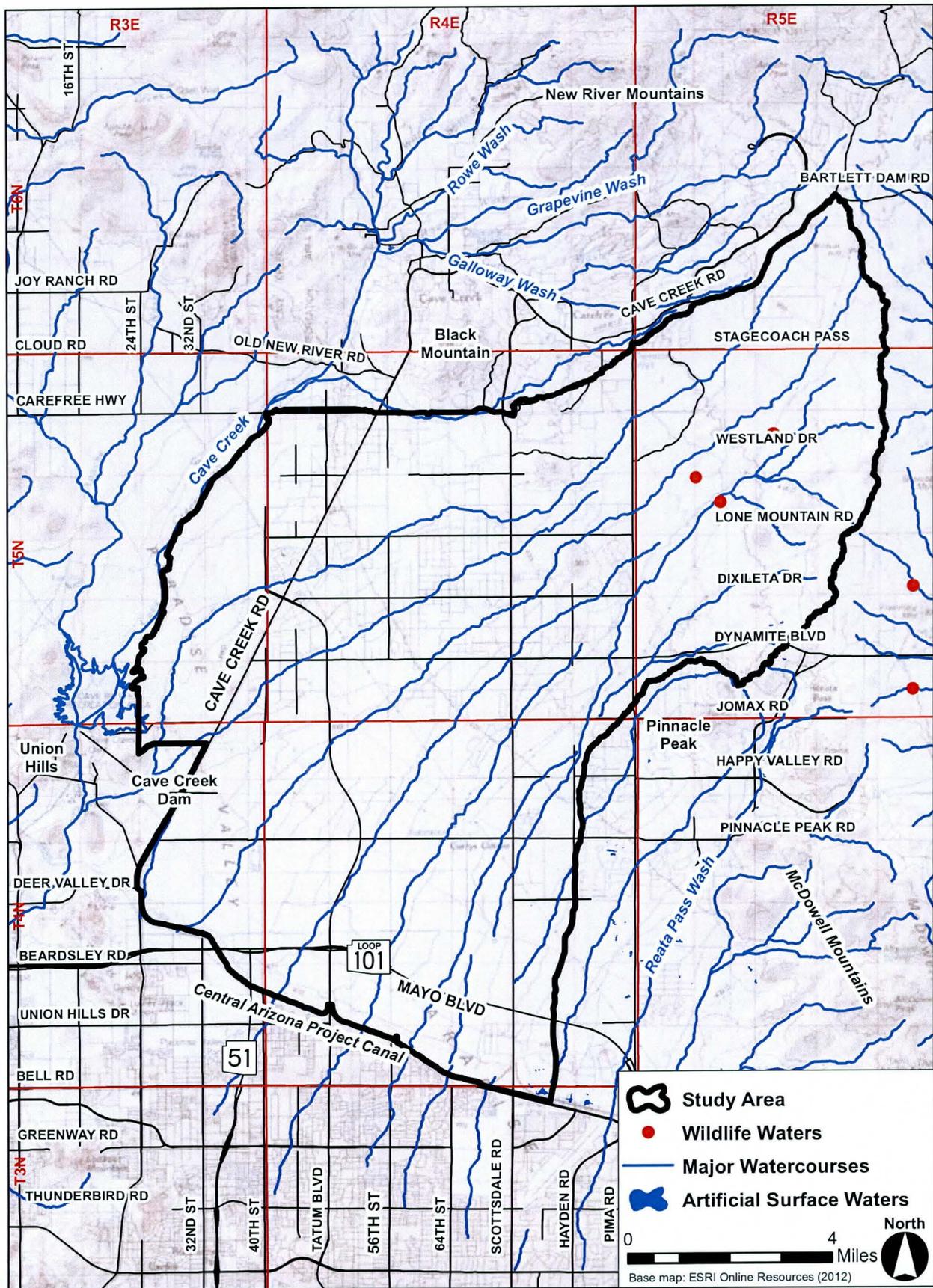


Figure 3. Topography and Surface Hydrology

### 3. *Surface Water Hydrology*

There are no perennial streams or other naturally occurring permanent surface waters in the study area. Watercourses consist of ephemeral drainages (desert washes) that flow only infrequently, when sufficient rain falls to cause runoff, and surface water is only present for a short period. During times when cattle were grazed, stock tanks were created and are still found throughout the study area. These ephemeral ponds retain water for only limited periods. To augment the supply of surface water for wildlife, the AGFD has created several artificial wildlife watering sites in the northeast portion of the study area. Similarly, improvements such as flood-control dikes and the earthen berm along the uphill side of the CAP Canal create areas where precipitation runoff accumulates and surface water temporarily ponds. Artificial surface waters include ponds and lakes associated with golf courses and developed parks. Figure 3 depicts the major water courses, created wildlife waters, and larger artificial surface waters in the study area.

### 4. *Soils*

Soils over the majority of the study area are of the Torrfluvents Association. These are deep, stratified, well-drained to somewhat excessively drained, coarse to fine-textured soils on nearly level to gently sloping floodplains and lower alluvial fans formed in sandy to clayey recent mixed alluvium. To the west and extending across the northeast portion of the study area, soils represent the Mohall-Vecont-Pinamt Association. These are deep, well-drained, moderately fine and fine-textured and gravelly, nearly level to gently sloping soils on valley plains formed in mixed old alluvium. Soils at the north end of the area are of the Lithic Torriorthents-Lithic Haplustolls-Rock Outcrop Association: shallow, well-drained, cobbly and gravelly soils of rock outcrops on hills and mountains formed in residuum weathered from granite, gneiss, rhyolite, andesite, tuffs, limestone, sandstone, and basalt. Soils in the McDowell Mountains are of the Lithic Camborthids-Rock Outcrop-Lithic Haplargids Association. This association consists of well-drained, shallow, very gravelly and cobbly, moderately coarse to moderately fine-textured soils on gentle to steep slopes and rock outcrop on hills and mountains formed of residual materials weathered from granitic rocks, schists, volcanic tuffs and conglomerates, basalt, and some shale and sandstone (Hendricks 1985, Richard et al. 2000).

### 5. *Land Use*

A substantial portion of the study area—formerly undeveloped, sparsely settled, and used primarily for cattle grazing—has been developed for residential, commercial, institutional, and recreational uses, including associated infrastructure. The transportation network includes the Loop 101, Cave Creek Road, Carefree Highway, and major arterial roadways such as Scottsdale Road. A number of existing and proposed master-planned communities occur in the study area and the surrounding areas. Recreational land uses include golf courses, municipal parks, and larger dedicated recreation areas such as Reach 11 directly north of the CAP Canal and a portion of the Cave Buttes Recreation Area in the southwest portion of the study area. Remaining natural open space or vacant land is concentrated in the northeast, south, and west portions of the study area (Figure 4). U.S. Forest Service lands in the northeast portion of the study area are managed for multiple uses, including recreation and livestock grazing. Similarly, Bureau of Land Management lands in the south portion of the study area are managed for multiple uses but likely do not currently support livestock grazing.

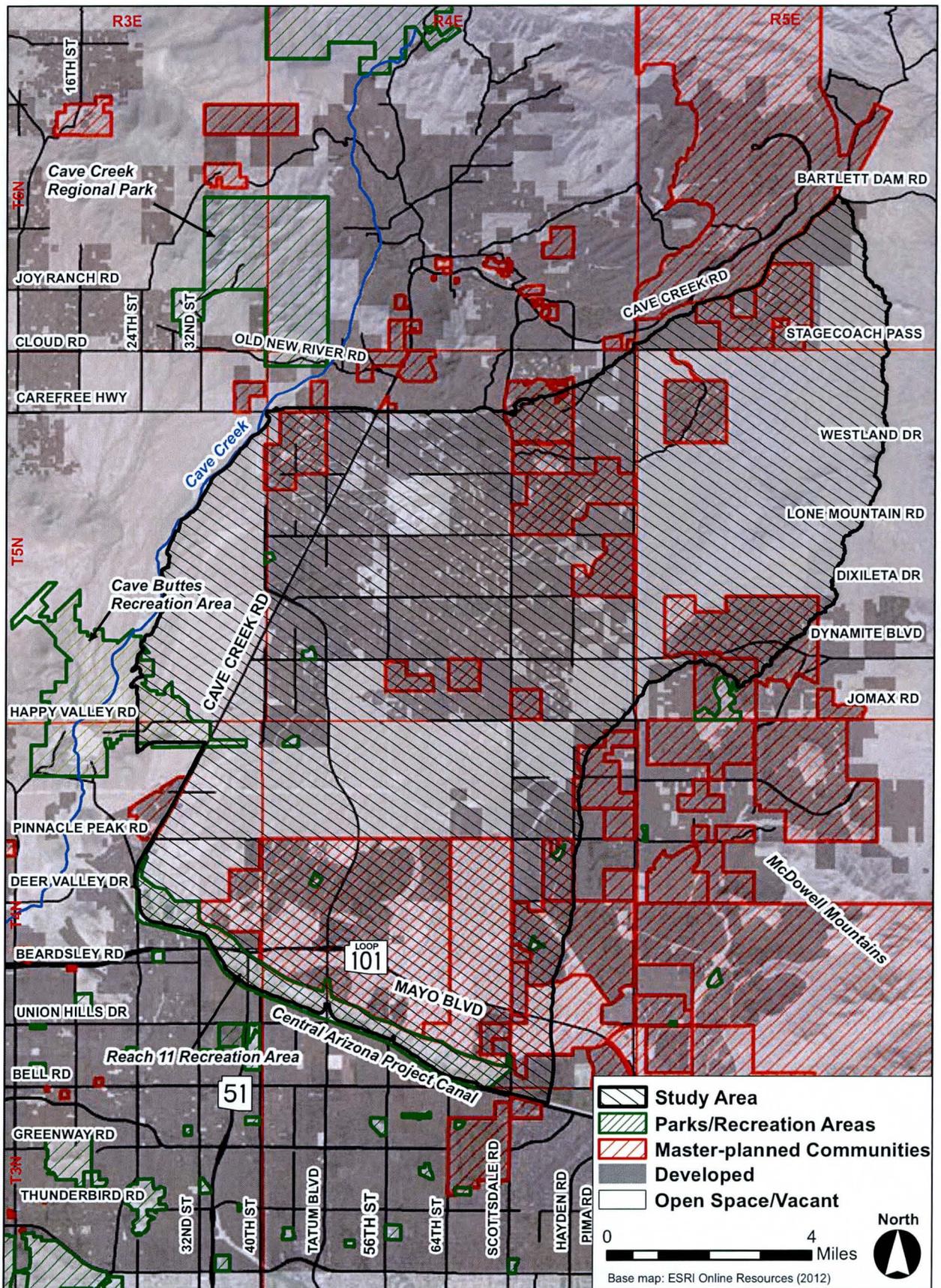


Figure 4. Major Land Uses

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## 6. Vegetation

The study area supports two general vegetation types or series within the Sonoran Desertscrub biome: Creosotebush-Bursage Series (Lower Colorado River Subdivision) and Paloverde–Mixed Cacti Series (Arizona Upland Subdivision). Mogollon Chaparral Scrubland: Mixed Evergreen Sclerophyll Series occurs to the north and outside of the study area, in the foothills associated with the New River Mountains, and in the Seven Springs area (Figure 5).

Creosotebush-Bursage Series vegetation occurs in the south and west portions of the study area. It is characterized by a relatively low diversity of plant species and is dominated by creosotebush (*Larrea tridentata*) and triangle-leaf bursage (*Ambrosia deltoidea*). Desert washes in this area include xeroriparian trees such as blue paloverde (*Parkinsonia florida*), desert ironwood (*Olneya tesota*), velvet mesquite (*Prosopis velutina*), and shrubs including Anderson thornbush (*Lycium andersonii*) and desert hackberry (*Celtis ehrenbergiana*). With increasing elevation and in transitional areas, species more commonly associated with Paloverde–Mixed Cacti Series increase in prominence in upland areas and along desert washes, including foothill paloverde (*Parkinsonia microphylla*) and saguaro (*Carnegiea gigantea*), alkali goldenbush (*Isocoma acradenia*), buck-horn cholla (*Cylindropuntia acanthocarpa*), pinkflower hedgehog cactus (*Echinocereus fasciculatus*), and candy barrelcactus (*Ferocactus wislizeni*). Lower Colorado River Subdivision Sonoran Desertscrub, to which this vegetation series belongs, is described as having a poor diversity of avifauna (birds) but varied herpetofauna (primarily reptiles) (Brown 1994).

Paloverde–Mixed Cacti Series vegetation occurs in the north and east portions of the study area. It is a relatively diverse plant community, dominated by combinations such as foothill paloverde and saguaro; blue paloverde, buck-horn cholla, and turpentine bush (*Ericameria laricifolia*); or crucifixion thorn (*Canotia holacantha*), flat-top buckwheat (*Eriogonum fasciculatum*), and banana yucca (*Yucca baccata*). There are many associated species, including desert trees, shrubs, and a diverse assemblage of cacti. Arizona Upland Subdivision Sonoran Desertscrub, to which this vegetation series belongs, is described as supporting a relatively diverse assemblage of wildlife, including mammals, birds, and reptiles (Brown 1994).

Throughout the study area, areas of past disturbance including washes may support extensive growth of desert broom (*Baccharis sarothroides*). Disturbed terrain along roadways may support invasive prickly Russian thistle (*Salsola tragus*) and other nonnative weedy plant species. Red brome (*Bromus rubens*), an invasive introduced annual grass that has the potential to carry wildfire between desert trees and shrubs, can be found throughout the study area, especially in rolling terrain.

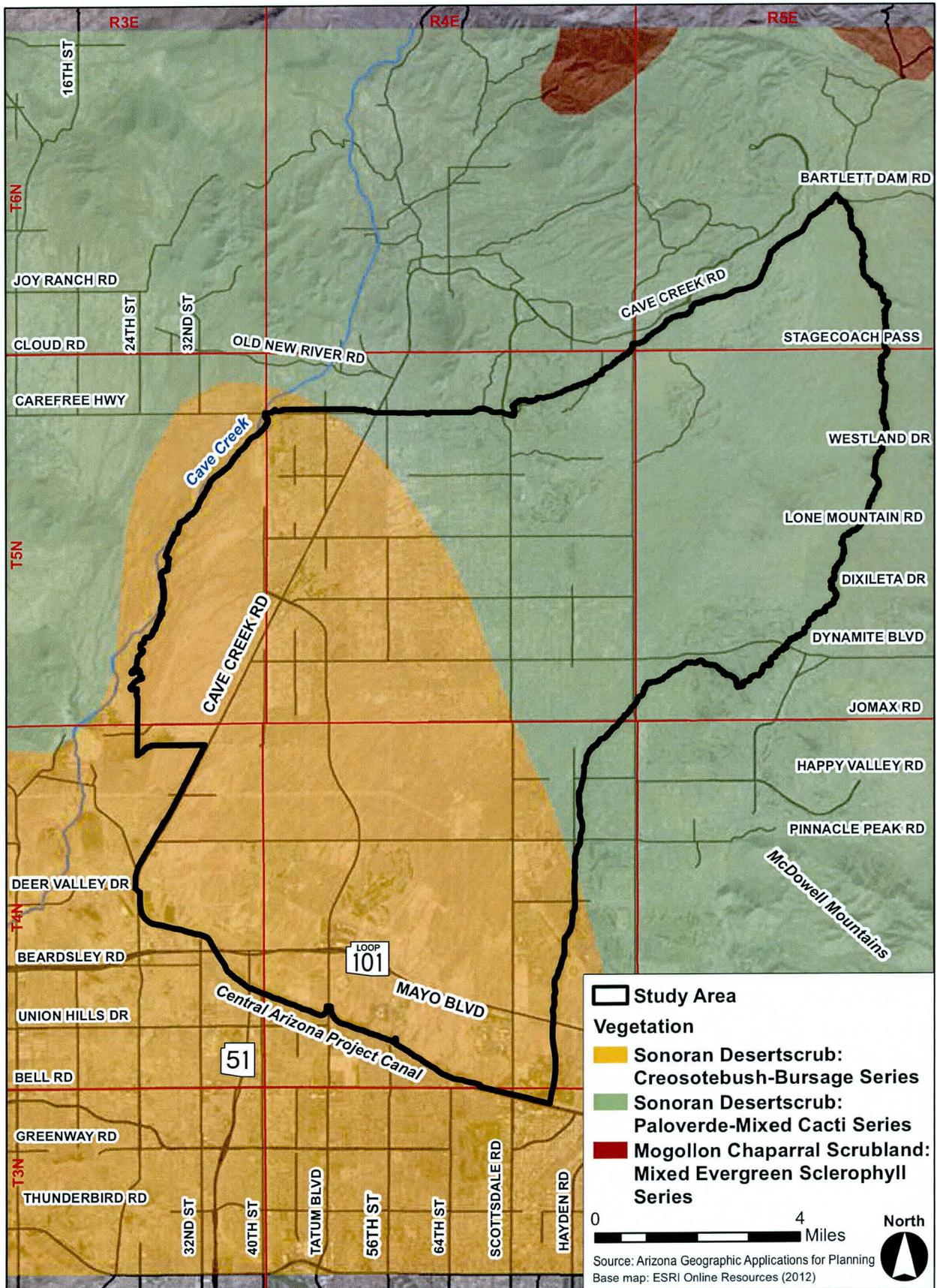


Figure 5. Vegetation

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## B. Environmental Planning Considerations

The following are resources or conditions in the study area that may require consideration during planning and design of flood hazard mitigation approaches, with implications of each discussed.

### 1. *Endangered, Threatened, Proposed, and Candidate Species*

Table 2 includes the USFWS list of endangered, threatened, proposed, and candidate species for Maricopa County (updated February 5, 2013, and accessed April 16, 2013), their habitat requirements, and reasons why these species would or would not be expected to occur in the study area. Potential for occurrence in the study area is limited to three species: the endangered lesser long-nosed bat, the candidate Tucson shovel-nosed snake, and the candidate Sonoran Desert tortoise. These are described in greater detail later.

**Table 2. USFWS Listed, Proposed, and Candidate Species in Maricopa County and Their Potential to Occur in the Study Area**

Name	Status	Habitat Requirements	Potential for Occurrence
Acuña cactus <i>Echinomastus erectocentrus</i> var. <i>acunensis</i>	PE	Well-drained knolls and gravel ridges in Sonoran desertscrub. Elevation: 1,198 to 3,773 feet.	Outside known geographic range and proposed critical habitat areas. Nearest documented occurrence in Maricopa County is from the Sand Tank Mountains in the southwest corner of the county. Nearest known occurrence to the study area is from Mineral Mountain in northeast Pinal County, approximately 50 miles southeast of the study area.
Arizona cliffrose <i>Purshia subintegra</i>	E	White limestone soils derived from tertiary lakebed deposits. Elevation: <4,000 feet.	No suitable habitat. No white limestone soils derived from tertiary lakebed deposits. The nearest known populations are about 10 miles northeast near the Horseshoe Reservoir.
California least tern <i>Sterna antillarum browni</i>	E	Open, bare, or sparsely vegetated sand, sandbars, gravel pits, or exposed flats along shorelines of inland rivers, lakes, reservoirs, or drainage systems. Elevation: <2,000 feet.	Generally, no suitable habitat. Bare, sparsely vegetated terrain surrounding Cave Creek Reservoir behind the Cave Creek Dam, at west edge of the study area, may occasionally provide potential habitat for this species; however, this reservoir rarely contains water and is unlikely to support suitable conditions of any duration. Species rarely seen in state but occasionally nests near permanent impoundments along the Salt River, about 20 miles south of study area.
Desert pupfish <i>Cyprinodon macularius</i>	E	Shallow springs, small streams, and marshes. Tolerates saline and warm water. Elevation: <4,000 feet.	No suitable habitat in study area; no perennial streams occur. Species nearly extirpated from the state. Some introduced populations are maintained within artificial impoundments in the Phoenix metropolitan area, within 20 miles southwest of study area.
Desert tortoise, Sonoran population <i>Gopherus morafkai</i>	C	Rocky and steep hillsides and bajadas of Mohave and Sonoran desertscrub, may encroach into desert grassland, juniper woodland, interior chaparral habitats, and pine communities. Elevation: <7,800 feet.	Numerous records of occurrence in study area. Northeast portion of study area represents the highest-quality habitat, though suitable habitat also mapped in south and west portions of study area.

**Table 2. USFWS Listed, Proposed, and Candidate Species in Maricopa County and Their Potential to Occur in the Study Area**

Name	Status	Habitat Requirements	Potential for Occurrence
Gila topminnow <i>Poeciliopsis occidentalis occidentalis</i>	E	Small streams, springs, and cienegas with vegetated shallows. Elevation: <4,500 feet.	No suitable habitat in study area; no perennial streams occur. Species extirpated from much of former range. Several captive populations in aquaria and artificial impoundments in the Phoenix metropolitan area. Nearest records from New River and Agua Fria River drainages, about 10 to 20 miles northwest of study area.
Lesser long-nosed bat <i>Leptonycteris curasoae yerbabuena</i>	E	Desertscrub habitat with agave and columnar cacti present as food plants. Elevation: <6,000 feet.	Study area at north extent of geographic range and potential food resources (i.e., saguaros) present. Species does not regularly range north of areas in Pinal County and extreme southern Maricopa County, more than 50 miles south. Infrequent, widely scattered, and dated records in Phoenix metropolitan area.
Mexican spotted owl <i>Strix occidentalis lucida</i>	T	Nests in canyons and mixed conifer or mature ponderosa pine/Gambel oak forests with multilayered foliage. Elevation: 4,100 to 9,000 feet.	No suitable habitat. Study area nearly 3,400 feet below species' normal elevation range. Nearest population is in Mazatzal Mountains, about 30 miles east.
Razorback sucker <i>Xyrauchen texanus</i>	E	Riverine and lacustrine areas. Generally not in fast-moving water. May use backwaters. Elevation: <6,000 feet.	No suitable habitat in study area; no perennial streams occur. Historically found in Gila and Colorado River drainages, including various tributaries of the Salt River drainage to within 30 miles of study area. Species largely extirpated from the state. Nearest introduced population occurs in the Verde River, approximately 15 miles east of study area.
Roundtail chub <i>Gila robusta</i>	C	Cool to warm waters of rivers and streams. Often occupy the deepest pools and eddies of large streams. Elevation: 1,000 to 7,500 feet.	No suitable habitat in study area; no perennial streams occur. Nearest records from Verde River, about 15 miles east of study area.
Sonoran pronghorn <i>Antilocapra americana sonoriensis</i>	E	Broad intermountain alluvial valleys with creosote-bursage and paloverde-mixed cacti associations. Elevation: 2,000 to 4,000 feet.	Within Maricopa County, currently found only in extreme southwest portion, about 100 miles southwest of study area.
Southwestern willow flycatcher <i>Empidonax traillii extimus</i>	E	Cottonwood/willow and tamarisk vegetation communities along rivers and streams. Elevation: < 8,500 feet.	No suitable habitat; no perennial streams or associated cottonwood/willow and tamarisk vegetation communities occur. Nearest seasonal populations along Verde River, about 15 miles east of study area.
Sprague's pipit <i>Anthus spragueii</i>	C	Strong preference to native grasslands with vegetation of intermediate height and lacking woody shrubs. Elevation: <5,000 feet.	No suitable grassland habitat in the study area. Rare in Arizona and not observed breeding in Maricopa County. The nearest breeding population is more than 120 miles south of study area.

**Table 2. USFWS Listed, Proposed, and Candidate Species in Maricopa County and Their Potential to Occur in the Study Area**

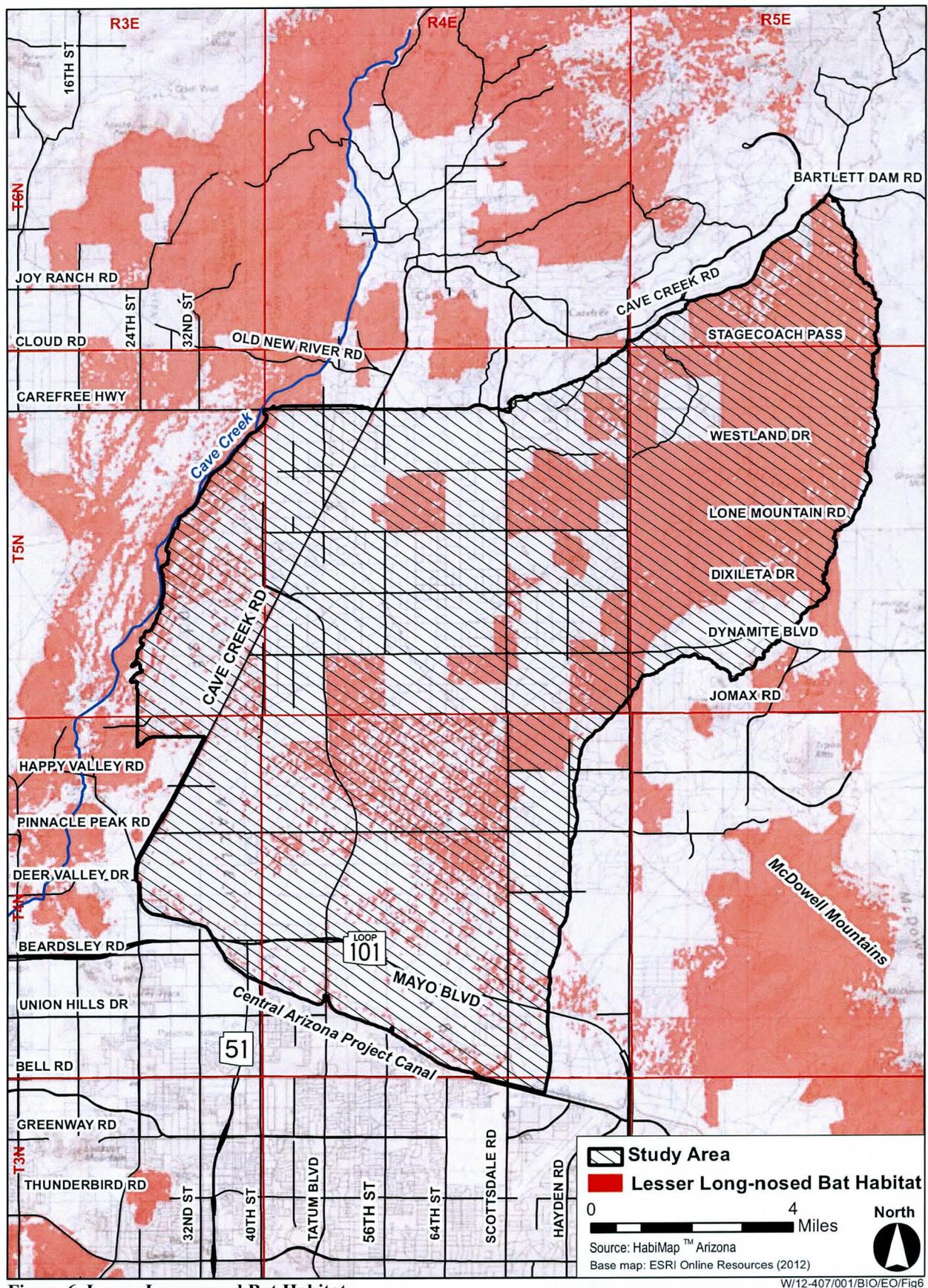
Name	Status	Habitat Requirements	Potential for Occurrence
Tucson shovel-nosed snake <i>Chionactis occipitalis klauberi</i>	C	Sonoran desertscrub, associated with soft, sandy soils having sparse gravel. Elevation 785 to 1,662 feet.	Southwest portion of study area supports valley bottom terrain with potentially suitable soils and vegetation. Subspecies not reported in northeast Maricopa County; several records along Interstate 8 in southeast Maricopa County, 50 miles southwest of study area.
Woundfin <i>Plagopterus argentissimus</i>	E	Inhabits shallow, warm, turbid, fast-flowing water. Tolerates high salinity. Elevation: < 4,500 feet.	No suitable habitat. No perennial streams in study area. Nearest introduced population occurs along Hassayampa River, about 50 miles west of study area.
Yellow-billed cuckoo <i>Coccyzus americanus</i>	C	Large blocks of riparian woodlands (cottonwood, willow, or tamarisk galleries). Elevation: <6,500 feet.	No suitable habitat. No perennial streams or large blocks of riparian woodlands (cottonwood, willow, or tamarisk galleries) in study area. Nearest seasonal populations along Verde River, about 15 miles east of study area.
Yuma clapper rail <i>Rallus longirostris yumanensis</i>	E	Fresh water and brackish marshes. Elevation: 4,500 feet.	No suitable habitat. No fresh water and brackish marshes in study area. Nearest populations along Salt and Verde rivers, about 20 miles southeast of study area.

C=Candidate, E = Endangered, PE = Proposed Endangered, T = Threatened (USFWS 2013)

**Lesser Long-nosed Bat (*Leptonycteris curasoae yerbabuena*)—Endangered**

The endangered lesser long-nosed bat is found in southern Arizona, generally from the Picacho Mountains southwest to the Agua Dulce Mountains, southeast to the Galiuro and Chiricahua mountains, and south into Mexico. It is seasonally present in the saguaro-dominated desert of south-central Arizona, with isolated records as far north as Phoenix (USFWS 1995). The recovery plan for this species identifies day roosts and concentrations of food plants as critical resources for this species. Day roosts, including maternity roosts, are found primarily in caves and mines. Primary food plants vary depending on the time of year and blooming season but consist of columnar cacti flowers and fruit (including saguaros) in spring and early summer and the flowers of paniculate agave from late summer to early fall (USFWS 1995, Wilson 1985).

Lesser long-nosed bats are unlikely to occur in substantial numbers in the study area. HabiMap™ shows the geographic range of this species as including portions of the study area, as well as areas farther north (Figure 6). Potential forage plants, specifically saguaros, are found in the highest densities in the northeast portion of the study area, in areas mapped as Paloverde–Mixed Cacti Series vegetation. Potential roosting habitat (e.g., mine adits) occurs in the McDowell Mountains east of the study area, within the foraging range of this species. However, few records of lesser long-nosed bats are in this part of Maricopa County. There is one record from 1993 at the Dixie Mine in the McDowell Mountains, but this was based on a visual identification of a bat leaving a mineshaft and could not be verified at the time or during subsequent visits to the site. Two other records from the Phoenix area, both from 1963, represent immature females found in Phoenix and Glendale, respectively (Constantine 1966). The recent discovery of Mexican long-tongued bats in the Grand Canyon introduces the possibility that some bats may have been mistaken for lesser long-nosed bats in this portion of Maricopa County (Sabra Tonn, AGFD, personal communication 2012).



Flood hazard mitigation that involves structural improvements may result in the removal of saguaros that represent potential foraging resources for lesser long-nosed bats and may require consultation with USFWS under Section 7 of the ESA. Portions of the study area mapped as Paloverde–Mixed Cacti Series vegetation (i.e., northeast portion) support the highest density of saguaros and would have the highest likelihood of affecting foraging habitat for this species. No roosting habitat occurs and the study area is unlikely to support substantial numbers of lesser long-nosed bats based on the lack of confirmed records.

### **Tucson Shovel-nosed Snake (*Chionactis occipitalis klauberi*)—Candidate**

The Tucson shovel-nosed snake was historically known from Pima County in the Avra and Santa Cruz valleys and from western Pinal County and a portion of eastern Maricopa County. As of 2001, more than one-third of the range of the Tucson shovel-nosed snake had been converted to urban development or agriculture. Areas affected by urban development and agriculture are considered unsuitable for this subspecies (Center for Biological Diversity 2004). Most of the currently occupied range of the Tucson shovel-nosed snake is believed to lie in southwest Pinal County and eastern Maricopa County, where the most recent records occur, though no systematic surveys have been conducted to assess the status of this species throughout their range (USFWS 2010). Areas of scattered sand hummocks, crowned with mesquite or other desert shrubs, are preferred habitat for shovel-nosed snakes. The Tucson shovel-nosed snake is found in more productive creosote-mesquite floodplain environments (USFWS 2010). This species has no known corridor or migratory needs, but potential barriers to movement include highways, major roads, and streams. In addition to urban and agricultural development, this species is adversely affected by road construction and maintenance, which can result in direct mortality and fragmentation of habitat (AGFD 2010).

HabiMap™ shows suitable habitat for the Tucson shovel-nosed snake (based on soils and vegetation) primarily in the south and west portions of the study area (Figure 7). There are no records of the Tucson shovel-nosed snake in the study area or within 3 miles. The closest known population occurs approximately 50 miles south of the project area.

Flood hazard mitigation may affect areas identified as suitable habitat for this species and may require consultation with USFWS under Section 7 of the ESA if this species is listed as threatened or endangered in the future. However, this is unlikely to represent a substantial planning constraint due to the lack of records of this species in the study area and because areas mapped as suitable habitat are substantially fragmented by urban and other development, including the Loop 101, CAP Canal, major arterial roadways, and residential subdivisions.

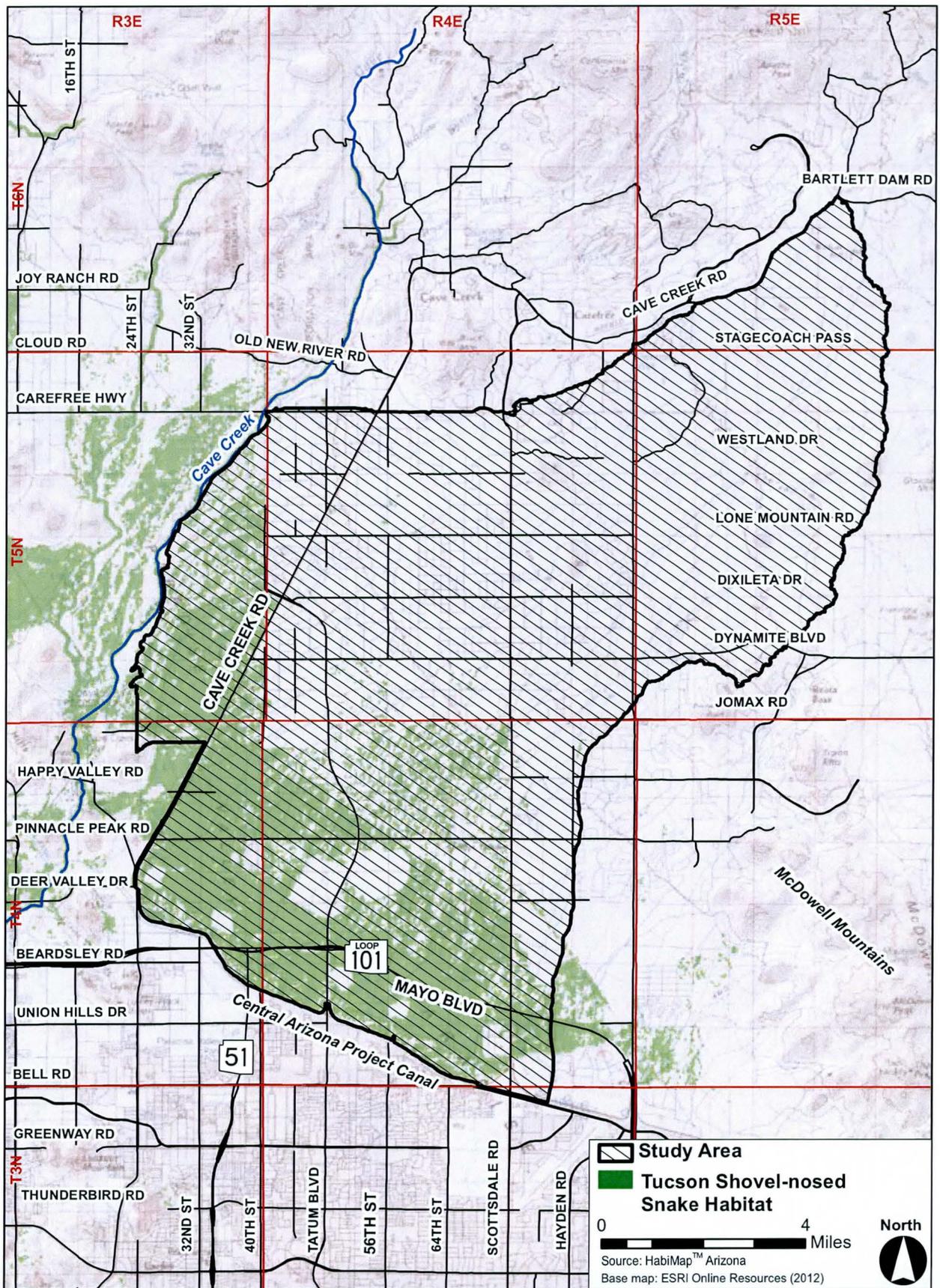


Figure 7. Tucson Shovel-nosed Snake Habitat

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### **Sonoran Desert Tortoise (*Gopherus morafkai*)—Candidate**

The Sonoran Desert population of the desert tortoise is typically associated with rolling, often rocky terrain in the foothills and desert mountain ranges, which provides more naturally occurring shelter sites than flatter terrain. Preferred Sonoran Desert tortoise habitat does not appear to extend far into the intermontane valleys (Averill-Murray et al. 2002a, Germano et al. 1994) though they may cross these between areas of preferred habitat (Edwards 2003, Edwards et al. 2004). Sonoran Desert tortoises most often use, and modify for their use, naturally occurring shelter sites such as caliche caves along arroyos, rock crevices, spaces under and among boulder piles, debris piles created by woodrats, or under thick vegetation. In this habitat, tortoises may also dig soil burrows to provide additional shelter sites (Averill-Murray et al. 2002b, Germano et al. 1994).

Suitable habitat for the Sonoran Desert tortoise occurs in portions of the study area. Figure 8 shows the distribution of suitable habitat for this species based on HabiMap™. The AGFD HDMS database includes 28 records of occurrence for this species in the study area, with a few records from the south and west and more records in the northeast portion (Courtney Paul, AGFD HDMS technician, personal communication). Remaining undeveloped areas west of Cave Creek Road and in the northeast portion of the study area are most likely to support desert tortoises. In these areas, occupied habitat is most likely found associated with rock outcrops, rocky slopes, and deeply incised washes with caliche caves that may serve as den sites. The south portion of the study area is likely only marginal habitat, based on its location on the lower bajada or on the desert plain.

Flood hazard mitigation may affect areas identified as suitable habitat for the Sonoran Desert tortoise and may require consultation with USFWS under Section 7 of the ESA if this species is listed as threatened or endangered in the future. Due to known occurrence of this species in the study area, this likely represents an important planning consideration. Barring any future listing, coordination with the AGFD regarding this species is highly recommended.

## **2. Other Special Status Species**

### **Zone-tailed Hawk (*Buteo albonotatus*)—U.S. Forest Service Sensitive, AGFD Wildlife of Special Concern**

The zone-tailed hawk is not expected to occur regularly in the study area. Though there are nesting records in Sonoran Desertscrub, it is more typically found at higher elevations and along large perennial watercourses lined by cottonwood and sycamore trees (e.g., the Verde River, 15 miles east) (Monson and Phillips 1981, Snyder 1998). The AGFD HDMS database includes a single record of occurrence for a pair of zone-tailed hawks nearly 3 miles north of the study area from mid-April 1982 (Courtney Paul, AGFD HDMS technician, personal communication). This species does not represent a substantial planning consideration with regard to flood hazard mitigation.

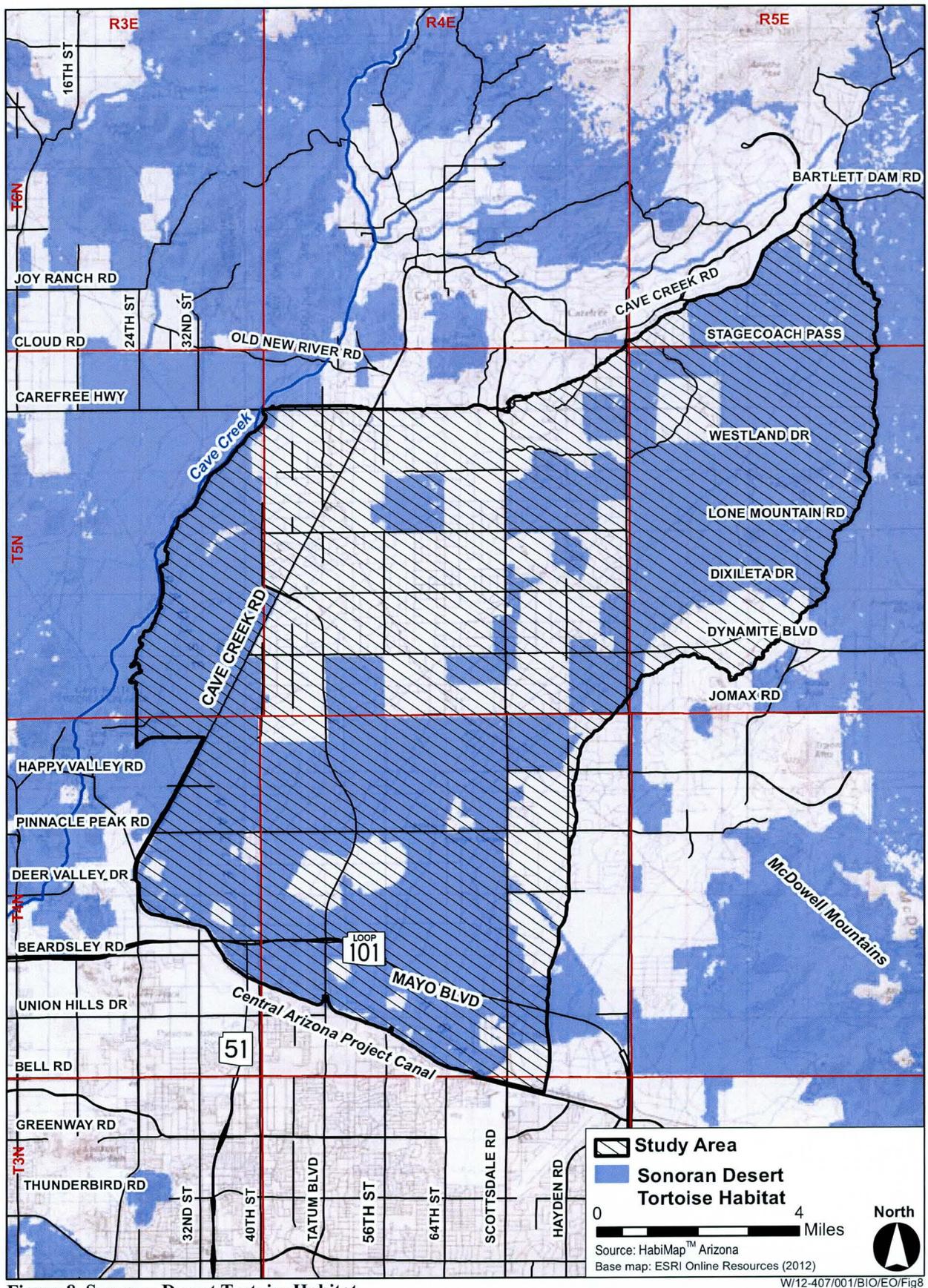


Figure 8. Sonoran Desert Tortoise Habitat

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**Lowland Leopard Frog (*Rana yavapaiensis*)—USFWS Species of Concern, U.S. Forest Service and Bureau of Land Management Sensitive, AGFD Wildlife of Special Concern**

Potential habitat for the lowland leopard frog is very limited in the study area. There are records of occurrence for this species within 3 miles of the study area, and HabiMap™ shows its distribution as encompassing the entire study area. However, lowland leopard frogs are associated with permanent or semi-permanent surface water features such as streams, cienegas, springs, lakes, ponds, and stock tanks (AGFD 2006). These types of features are lacking from the study area, though some occur nearby. The East Fork of Cave Creek currently supports a perennial reach of stream in an area immediately north of the study area, just north of the Carefree Highway and crossing Tom Darlington Drive. Perennial flows along this stream reach appear to be the result of runoff from an adjacent golf course since the reach upstream of the golf course is ephemeral. Lowland leopard frogs were observed along the perennial reach of the East Fork of Cave Creek as recently as April 9, 2004, and the population is thought to persist in the area today. Two additional records for the species also occur along the North Fork of Cave Creek—one, a historic record from 1969, and the other, a population observed on May 31, 2007, and considered extant. Both of these locations lie well outside the study area but within 3 miles (Courtney Paul, AGFD HDMS technician, personal communication).

The perennial reach of stream along the East Fork of Cave Creek may have been present prior to the construction of the golf course at its upper end; however, it is likely that this perennial reach will exist as long as the golf course provides supplemental water to support it. Therefore, it can be assumed that the associated lowland leopard frog population will persist and may provide a center of dispersal for frogs to other areas of surface water in the area, perhaps including sites in the study area.

Currently, the study area does not support perennial streams and riparian habitat preferred by the lowland leopard frog. Artificial stock tanks or other ponding areas (such as those created by the CAP Canal within the Reach 11 Recreation Area) are rarely perennial, generally containing water for only a few months each year, but could support frogs when water is present. Artificial ponds at golf courses, municipal parks, and at private residences provide year-round water and likely provide the only permanent surface water in the study area. Such sites may act as refugia if frogs can successfully disperse there from existing populations along the East Fork of Cave Creek.

Lowland leopard frogs are not considered an important planning consideration at this time with regard to flood hazard mitigation. There are no records of occurrence in the study area, and potential habitat is limited to permanent ponds and lakes associated with golf courses, parks, and other developed areas. Remnant stock tanks in the study area that may be affected by future flood hazard mitigation measures provide potential habitat for this species, though this is considered unlikely based on the distance from existing populations and the ephemeral nature of these features. The lowland leopard frog is not listed as threatened or endangered and is not a proposed or candidate species for listing. It is therefore not subject to regulatory requirements under the ESA.

**Western Burrowing Owl (*Athene cunicularia hypugaea*)—U.S. Forest Service Sensitive, Bureau of Land Management Sensitive**

The AGFD HDMS database does not include any records of the Western burrowing owl in the study area, though this species has the potential to occur. Burrowing owls prefer open areas and, in this part of the state, are often associated with agricultural fields, where their burrows may be found in road and canal banks. They also occur sporadically in sparse, open stands of creosotebush. In the study area, the highest potential for their occurrence is in remaining undeveloped areas mapped as Sonoran Desertscrub: Creosotebush-Bursage Series vegetation along Reach 11 to the south and along the Cave Creek corridor to the west. Burrowing owls are protected under the Migratory Bird Treaty Act. Due to their tendency to remain in burrows when disturbed, construction activities, including those associated with flood hazard mitigation, have the potential to impact this species. This can be addressed through preconstruction surveys and implementation of mitigation that involves the capture and relocation of individual owls.

**Arizona Protected Native Plants**

The study area supports a number of plant species protected under the Arizona Native Plant Law (Arizona Department of Agriculture 2012). Table 3 lists the protected plant species observed during field reconnaissance, including their classification under the Native Plant Law. This is not intended to be a complete list, and additional species are expected to occur in the study area.

**Table 3. Protected Native Plants Observed in the Study Area**

Common Name	Scientific Name
<b>Harvest-Restricted Protected Native Plants</b>	
Banana yucca	<i>Yucca baccata</i>
Desert ironwood	<i>Olneya tesota</i>
Velvet mesquite	<i>Prosopis velutina</i>
<b>Salvage-Assessed Protected Native Plants</b>	
Blue paloverde	<i>Parkinsonia florida</i>
Desert ironwood	<i>Olneya tesota</i>
Foothill paloverde	<i>P. microphylla</i>
Velvet mesquite	<i>Prosopis velutina</i>
<b>Salvage-Restricted Native Plants</b>	
Banana yucca	<i>Yucca baccata</i>
Barrel cactus	<i>Ferocactus cylindraceus</i>
Buck-horn cholla	<i>Cylindropuntia acanthocarpa</i>
Candy barrelcactus	<i>F. wislizeni</i>
Desert Christmas cactus	<i>C. leptocaulis</i>
Jumping cholla	<i>C. fulgida</i> var. <i>fulgida</i>
Ocotillo	<i>Fouquieria splendens</i>
Pinkflower hedgehog cactus	<i>Echinocereus fasciculatus</i>
Saguaro	<i>Carnegiea gigantea</i>
Soaptree yucca	<i>Y. elata</i>

The presence of protected native plants represents a limited planning consideration with regard to flood hazard mitigation. Removal of protected native plants is subject to requirements for notification to the Arizona Department of Agriculture and regulations with regard to salvage. There are no records of highly safeguarded plant species in the study area, and most of these species are not expected to occur. Two highly safeguarded plant species have the potential to

occur but are rare and unlikely to be affected by flood hazard mitigation: Hohokam agave (*Agave murpheyi*, typically associated with archaeological sites) and the crested or fan-top form of the saguaro.

### 3. *Wildlife Linkages and Habitat*

#### **Wildlife Linkages**

The Maricopa County Wildlife Connectivity Assessment (AGFD 2012) identifies four wildlife linkages that affect the study area (Figure 9). Flood hazard mitigation in areas identified as linkages may require consultation with the AGFD, the USFWS, and other agencies and stakeholders to determine the effects on target wildlife species (i.e., compatibility with the environment) and acceptability to the local communities and are therefore an important planning consideration. Effects would depend on target species and their current distribution, existing barriers and other threats to the linkage, and the type of flood hazard mitigation considered.

#### *CAP Wildlife Linkage*

The CAP linkage consists of floodplain set-asides and CAP right-of-way lands adjacent to the canal and provides linkage opportunities for drainage basins and surface drainage crossing along the canal. In the study area, this linkage connects the southern flanks of the McDowell Mountains with Cave Creek and provides connections to the Reata Pass Wash–CAP and the Cave Creek linkages. Identified target species are coyote, javelina, fox, badger, hawk, owl, and deer. Threats and barriers to this linkage include urbanization, agriculture, the CAP Canal, chain-link fences along canals, roads, and developed recreational areas. This linkage has broad support from various municipal and county organizations, the Central Arizona Water Conservation District, the Maricopa Association of Governments, the Arizona State Land Department, and the Salt River Pima–Maricopa Indian Community for conservation as open space and for a multi-use trail corridor (AGFD 2012).

The functionality of this linkage is limited to certain species of wildlife. This includes birds, some reptiles, and small- to medium-sized mammals that can persist in fragmented and partly urbanized settings (e.g., coyote, fox, and javelina). Its functionality for larger wildlife species such as mule deer is limited due to the degree of adjacent development and major transportation infrastructure that crosses the linkage area.

#### *McDowell Mountain Preserve–Tonto National Forest Wildlife Linkage*

This linkage connects the McDowell Sonoran Preserve east of the study area with the Camp Creek area to the north. Target species identified for this linkage are mule deer, javelina, and mountain lion. Current threats or barriers include urbanization and roadway expansion. This linkage is based on the current linkage plan for the McDowell Sonoran Preserve, developed by the City of Scottsdale (AGFD 2012).

This linkage has a comparatively high degree of functionality. It is in a relatively undeveloped portion of the study area and supports the target species. It also connects, at its south end, to the Reata Pass Wash–CAP Wildlife Linkage that is outside the study area but provides a connection to the CAP Wildlife Linkage along the western flanks of the McDowell Mountains.

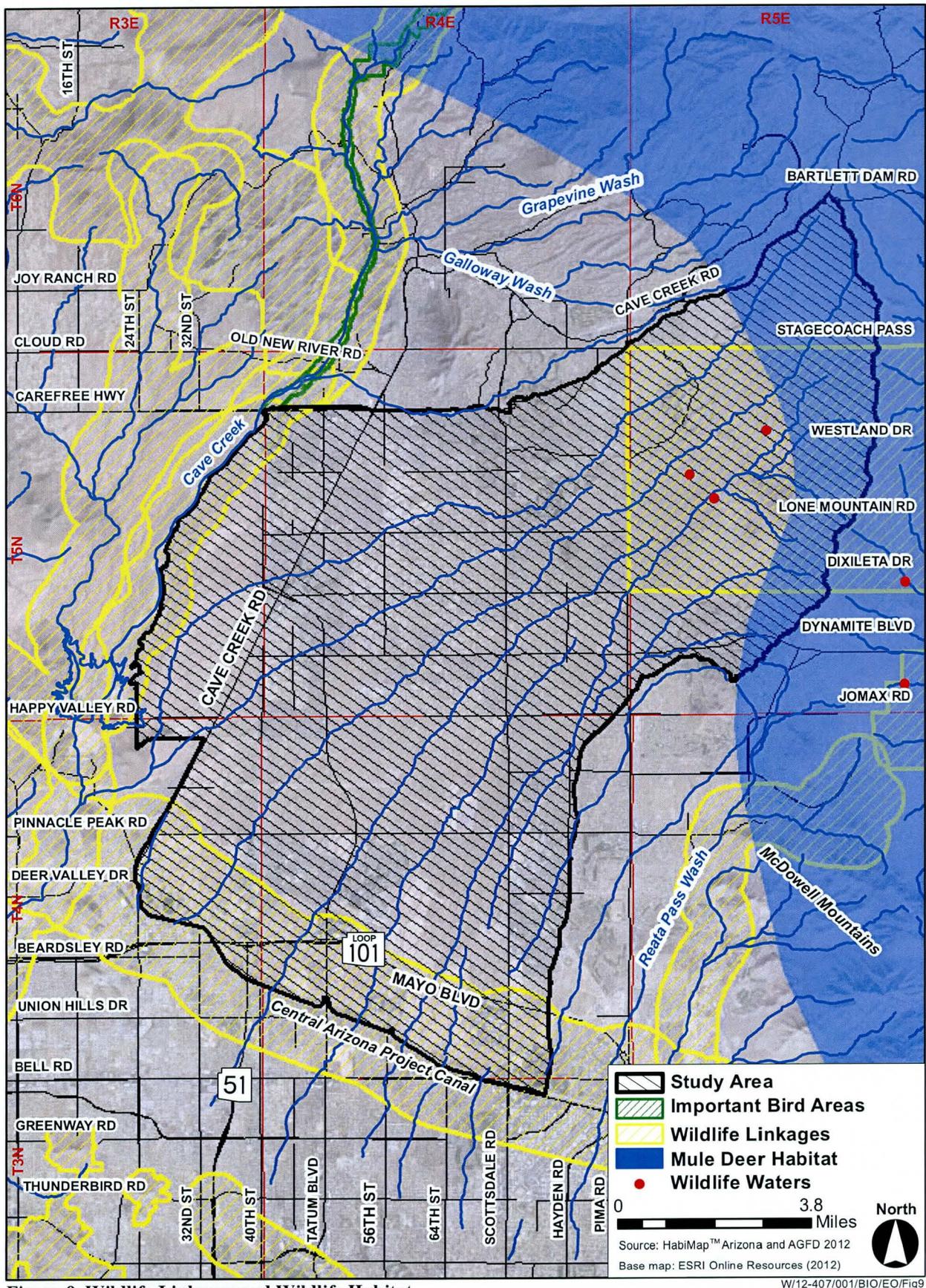


Figure 9. Wildlife Linkages and Wildlife Habitat

### *Cave Creek Wildlife Linkage*

This linkage borders the west edge of the study area along Cave Creek and connects the CAP Wildlife Linkage to habitat blocks to the north, including Spur Cross Ranch, Cave Creek Park, Go John Canyon Preserve, and the Tonto National Forest. It also provides connections to the Cave Buttes Recreation Area and the Phoenix Sonoran Preserve to the west and to the Cave Creek Important Bird Area just north of the study area. Target species identified for this linkage are mule deer, coyote, javelina, quail, dove, numerous reptiles and small mammals, gray fox, bobcat, raptors, and song birds. Threats or barriers to this linkage include the Loop 101, Carefree Highway, urbanization, livestock grazing, and developed recreational areas/uses (AGFD 2012).

This linkage currently has a relatively high degree of functionality, though use of this corridor by larger mammals such as mule deer is likely to be limited based on the mapped distribution of this species (Figure 9), at least at the south end of the linkage area.

### **Wildlife Habitat**

Consideration of wildlife habitat during planning is important due to its inherent value, its value to the public and stakeholders, and the environmental compatibility and acceptability of flood hazard mitigation measures to local communities, agencies, and special interest groups.

#### *Arizona Upland Subdivision Sonoran Desertscrub*

This biome, which comprises roughly the northeast half of the study area (Figure 5), receives more precipitation than the Lower Colorado River Subdivision biome that makes up the southwest half. As such, it supports a higher density and floristic diversity of plants, more structural diversity of vegetation, and higher density and diversity of wildlife species. The Paloverde–Mixed Cacti Series vegetation type associated with this biome in the study area is known for its rich avifauna. This subdivision also supports a diversity of mammal species and is the distribution center for a number of reptile species with limited geographic ranges (Brown 1994).

#### *Xeroriparian Habitat*

Larger desert washes support higher density and structural diversity of vegetation than adjacent upland areas. These habitats are often characterized by the presence of trees such as blue paloverde, mesquite, ironwood, and catclaw acacia and larger shrubs such as thornbush, canyon ragweed, and desert lavender. As such, they provide natural movement corridors, thermal cover, concentrated food resources, and nesting/breeding habitat for wildlife. They also function as stopover habitat for migrating songbirds. The relative importance of these habitats is greater in Lower Colorado River Subdivision Sonoran Desertscrub/Creosotebush-Bursage Series vegetation types, where adjacent upland vegetation is sparse and trees are widely scattered or absent. Major watercourses identified in Figure 3 as well as many of the smaller desert washes in the study area support xeroriparian habitat.

#### *Important Birds Areas*

The Important Bird Areas (IBA) Program identifies sites that maintain the long-term viability of wild bird populations and engages the public to conserve those areas of critical habitat. In Arizona, the IBA Program is administered by Audubon Arizona and the Tucson Audubon

Society and works in partnership with the AGFD, the Sonoran Joint Venture, the Intermountain West Joint Venture, Arizona State Parks, and the USFWS.

No IBAs are identified in the study area. However, the Cave Creek Complex IBA extends to the north study area boundary (Figure 9). This IBA includes a 17-mile riparian corridor along perennial and intermittent reaches of Cave Creek, portions of three tributary washes, and associated uplands and includes Tonto National Forest lands, a portion of the Spur Cross Ranch Conservation Area, five Desert Foothills Land Trust preserves, and connecting flood-prone lands. The Cave Creek Complex IBA supports cottonwood/willow/sycamore and mesquite bosque riparian areas and associated desert scrub uplands. It provides habitat for a variety of wildlife species, including five Audubon WatchList species: Abert's towhee, Lucy's warbler, Bell's vireo, Costa's hummingbird, and Gilded flicker (Arizona IBA Program 2012).

#### *Species and Habitat Conservation Guide*

The AGFD Species and Habitat Conservation Guide identifies areas of wildlife conservation potential in Arizona at a landscape or statewide scale and guides the AGFD's strategic wildlife goals and objectives. This classification represents a composite index of several other layers in HabiMap™: Species of Greatest Conservation Concern, Species of Economic and Recreational Importance, Sportfish, Riparian Areas, and Unfragmented Areas. Figure 10 shows Species and Habitat Conservation Guide classifications for the study area and vicinity, with darker coloration showing areas of high conservation value. The northeast portion supports the highest conservation values based on this index.

## **4. Special Designation Areas**

### **Preserves**

The study area includes portions of the McDowell Sonoran Preserve, designated by the City of Scottsdale and created to establish in perpetuity a preserve of Sonoran Desert and mountains to protect natural and cultural resources and to provide public access for educational and passive recreational purposes. At this time, the City of Scottsdale has protected 27,800 acres as part of the preserve. The most recent land acquisition for the preserve occurred in November 2012, when an additional 6,400 acres of land were acquired from the Arizona State Land Department in the northern region of the preserve. This latest acquisition of land completes the wildlife linkage between the McDowell Mountains and the Tonto National Forest. Planning is underway for the acquisition of an additional 2,400 acres of State Land in the interior of the McDowell Mountains in fall 2013 (located outside the study area boundaries). Existing components of the McDowell Sonoran Preserve in the study area are shown on Figure 11.

Areas designated or planned as future preserve lands represent a substantial planning consideration with regard to flood hazard mitigation since structural improvements may be precluded from these areas.

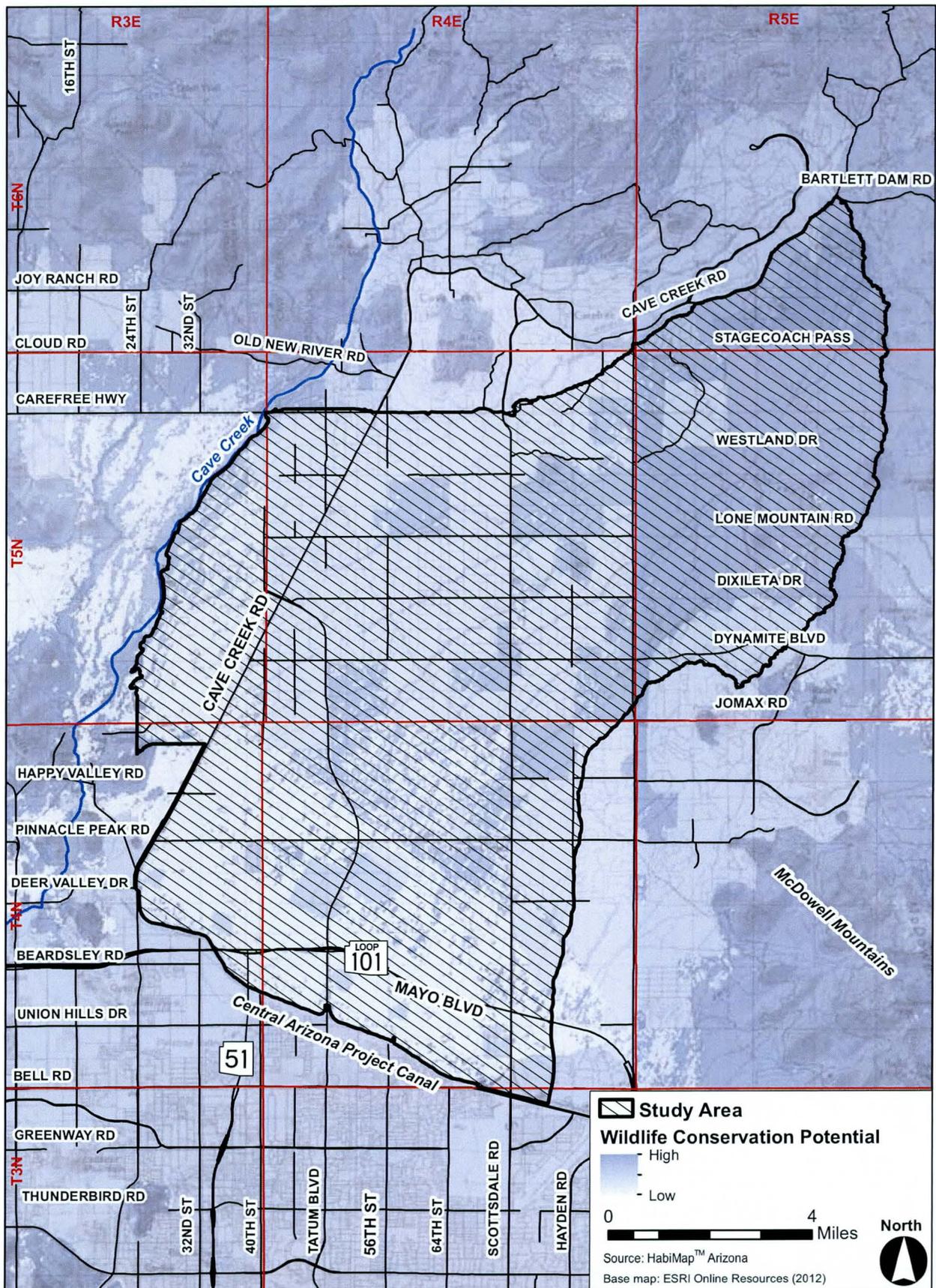


Figure 10. Wildlife Conservation Potential

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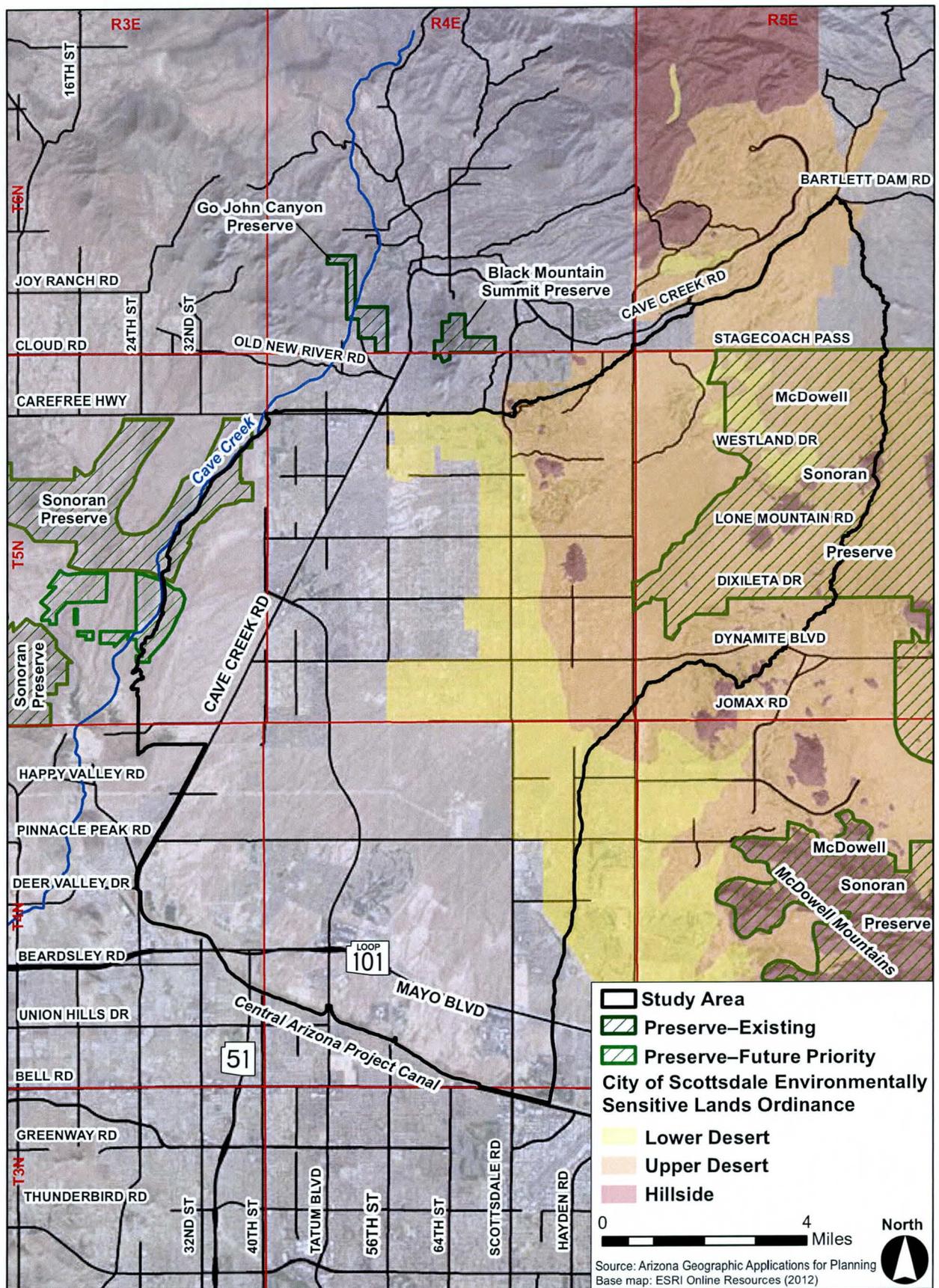


Figure 11. Special Designation Areas

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Several other preserves occur in or near the study area. A small portion of the Phoenix Sonoran Preserve along and east of Cave Creek is in the study area. Go John Canyon Preserve and Black Mountain Summit Preserve are both outside and north of the study area. In its zoning ordinance for development review procedures, the City of Phoenix has prescribed “edge treatments” for lands adjacent to the Phoenix Sonoran Preserve. These include development restrictions on steeper slopes, prohibition on gated communities to maintain public access to the preserve, and other environmentally sensitive measures. The guidelines encourage the use of the desert wash system for stormwater management and allow for the natural function of floodplains. Therefore, these guidelines factor into any flood hazard mitigation on lands adjacent to the preserve.

### **Environmentally Sensitive Lands**

The City of Scottsdale adopted their Environmentally Sensitive Lands Ordinance (ESLO) in 1991 to guide the development on 134 square miles of desert and mountain areas in north Scottsdale. The purpose of this ordinance is to ensure protection of unique natural features such as mountains and hills, large rock formations, native vegetation, archeological and historical sites, and significant washes. In addition to the protection of unique natural and cultural resources, ESLO requires that a percentage of each property be permanently preserved as Natural Area Open Space (NAOS). Figure 11 shows the portions of the study area that are included in the ESLO overlay. Environmentally Sensitive Lands are mapped as three landforms under the ordinance: Lower Desert, Upper Desert, and Hillside. Areas mapped as Hillside are most restrictive with regard to development intensity and have the highest requirement for NAOS, while Lower Desert areas are least restrictive and have the lowest NAOS requirements. Flood hazard mitigation in these areas would need to consider impacts to unique resources, solutions that are compatible with the character and nature of these settings, and development intensity and NAOS set-aside requirements associated with landform types mapped under ESLO.

### **5. *Waters of the United States***

Waters of the United States (Waters) in the study area consist primarily of ephemeral drainages, stock tanks, and other impoundments. No wetlands are identified on the NWI mapping, and their occurrence in the study area is considered rare.

Important planning considerations include the extent and characteristics of Waters and the permitting requirements related to urban and other development. The U.S. Army Corps of Engineers (Corps) administers Section 404 of the Clean Water Act and is responsible for the issuance of permits regulating placement of fill in Waters. Most ephemeral drainages in the study area fall under potential Corps jurisdiction, and the placement of fill materials associated with improvements is subject to permitting requirements. The lower and south portion of the study area represents an alluvial fan with a distributary flow pattern. This results in a high density of washes that makes it difficult to avoid impacts and complicates the Section 404 permitting process. This distributary flow pattern also complicates floodplain mapping and is an important consideration for flood hazard mitigation. Flood hazard solutions that capture flows at the alluvial fan apex to eliminate distributary flows and reduce the area of flood hazard downstream must also consider indirect impacts to Waters from discontinuation of flows to some or most channels. This could also affect existing Section 404 mitigation areas (i.e., restored wash corridors) and the ability of current permittees associated with downstream developments (e.g., Desert Ridge, Paradise Ridge) to meet permit obligations.

Numerous Section 404 permits and authorizations have been issued in the study area. At least 26 master-planned communities occur in the study area, a substantial number of which are likely to have been issued Section 404 permits and some of which have on-site mitigation areas. Section 404 permits and authorizations have also been issued for other activities, including commercial and institutional developments, transportation and utility infrastructure developments, and flood control projects. Potential flood hazard solutions will need to consider impacts on Section 404 permittee obligations, particularly with regard to existing or planned mitigation areas and the maintenance of flows in preserved washes. At the point when site-specific flood hazard solutions are being evaluated, the Corps should be contacted to obtain a list of Section 404 permits issued in the affected area, including all associated permit conditions. The Corps maintains a database that can be queried based on specific project locations. At this time, Corps policy dictates that such queries are requested via a Freedom of Information Act request that is processed through the Corps' District Office in Los Angeles.

## **IV. Summary of Planning Considerations**

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### **A. Threatened, Endangered, Proposed, and Candidate Species**

The study area supports habitat for the candidate Sonoran Desert tortoise. This species could be affected by habitat disturbance from structural flood control improvements or potential floodplain remapping that removes some habitat areas from currently designated flood hazard zones. If the Sonoran Desert tortoise becomes listed as threatened or endangered, consultation with the USFWS would be required and could substantially limit flood hazard mitigation options. Coordination with the AGFD regarding desert tortoise is highly recommended. The study area is within the described geographic ranges of the endangered lesser long-nosed bat and the candidate Tucson shovel-nosed snake. Flood hazard mitigation may necessitate consultation with the USFWS, but these species are not anticipated to occur in substantial numbers in the study area, based on the lack of records and current habitat conditions, and therefore do not represent a substantial planning consideration.

### **B. Other Special Status Species**

Other special status species with records near the study area, specifically the zone-tailed hawk and lowland leopard frog, are not anticipated to occur in the study area, at least in substantial numbers, and therefore are not an important consideration in flood hazard mitigation planning. Protected native plants occur throughout and their removal or disturbance would require compliance with Arizona Department of Agriculture regulations regarding notification and salvage.

### **C. Wildlife Linkages and Habitat**

Wildlife linkages that have been mapped in the study area have been identified through an extensive and collaborative effort among resources agencies, others agencies and experts, Maricopa County, local communities, and other stakeholders. Flood hazard mitigation that affects identified linkage areas would need to consider the effects on target species and ways to reduce adverse impacts on wildlife movement and habitat connectivity and would merit consultation with agencies and other stakeholders.

Xeroriparian habitat occurs along most ephemeral drainages and provides important habitat for wildlife. Flood hazard mitigation affecting these areas would need to consider the impacts on habitat and would also be regulated by the Corps under Section 404 of the Clean Water Act.

The Cave Creek Complex IBA lies just outside the study area but contributes to the importance of the Cave Creek Wildlife Linkage, which also provides connections to the Phoenix Sonoran Preserve west of the study area and the CAP Wildlife Linkage along the southern study area boundary.

The northeast portion of the study area is largely undeveloped and has moderately high to high wildlife habitat conservation value based on relatively low levels of fragmentation and because it supports habitat for mule deer, mountain lion, javelina, and other wildlife. It also provides habitat connectivity for these and other wildlife species between the McDowell Mountains and the Tonto National Forest north of the study area, and has therefore been identified as an important

linkage (McDowell Mountain Preserve–Tonto National Forest Wildlife Linkage). We recommend coordinating with the AGFD regarding the Species and Habitat Conservation Guide and wildlife conservation potential in the study area as it relates to potential flood hazard mitigation measures.

#### **D. Special Designation Areas**

Portions of the McDowell Sonoran Preserve fall within the northeast and east parts of the study area. Flood hazard mitigation involving structural improvements may be precluded in these areas. Flood hazard mitigation on lands that fall within the City of Scottsdale’s ESLO overlay would need to protect important natural and cultural resources and would be subject to NAOS set-aside requirements that vary based on mapped landform type.

#### **E. Waters of the United States**

The distribution and nature of Waters in the study area represent a substantial planning constraint or consideration for flood hazard mitigation. This includes the need for avoidance, minimization, and mitigation of impacts under Section 404 of the Clean Water Act; Corps permitting requirements; and the potential for substantial indirect impacts from flood hazard solutions targeted at the alluvial fan apex. The Corps should be contacted regarding Section 404 permits or authorizations that have been issued in the affected area at the point when site-specific flood hazard solutions are being evaluated.

## V. Literature Cited

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**Appendix**

**Photo Log**

Note: Points are listed as Universal Trans Mercator coordinates in North American Datum 1927 Central U.S.



**Photo 1. View of mesquite woodland just north of the Central Arizona Project Canal and just west of Tatum Boulevard, facing southwest (409348E, 3725172N).**



**Photo 2. View of Creosotebush-Bursage Series vegetation just west of Scottsdale Road, 0.5 mile south of Pinnacle Peak Road, facing southwest (413981E, 3726408N).**

Note: Points are listed as Universal Trans Mercator coordinates in North American Datum 1927 Central U.S.



**Photo 3. View of dry stock tank northwest of Scottsdale Road and Thompson Peak Parkway, facing west (413784E, 3726467N).**



**Photo 4. View of Paloverde–Mixed Cacti Series vegetation just west of Scottsdale Road and just south of Pinnacle Peak Road, facing south (414164E, 3728924N).**

Note: Points are listed as Universal Trans Mercator coordinates in North American Datum 1927 Central U.S.



**Photo 5. View of Paloverde–Mixed Cacti Series vegetation toward a commercial complex northeast of the intersection of Scottsdale Road and Pinnacle Peak Road, facing northeast (414201E, 3728964N).**



**Photo 6. View of the rural development north of Jomax Road west of Scottsdale Road, facing northeast (413158E, 3732264N).**

Note: Points are listed as Universal Trans Mercator coordinates in North American Datum 1927 Central U.S.



**Photo 7. View of Jomax Road and 40th Street, facing south (407666E, 3732293N).**



**Photo 8. View of Creosotebush-Bursage Series vegetation, northwest of Jomax Road and 40th Street, facing west (407625E, 3732320N). Note the Union Hills in the distance.**

Note: Points are listed as Universal Trans Mercator coordinates in North American Datum 1927 Central U.S.



**Photo 9. View of Paloverde–Mixed Cacti Series vegetation west of 40th Street and north of Tatum Boulevard, facing west (407794E, 3735863N).**



**Photo 10. View of bridges under construction at the future crossing of Cave Creek Wash at North Peak View Road, facing west (405278E, 3736130N).**

Note: Points are listed as Universal Trans Mercator coordinates in North American Datum 1927 Central U.S.



**Photo 11. View upstream along Cave Creek Wash at the North Peak View Road bridge, facing northeast (405098E, 3736287N).**



**Photo 12. View downstream along Cave Creek Wash at the North Peak View Road bridge, facing southwest (405098E, 3736287N).**

Note: Points are listed as Universal Trans Mercator coordinates in North American Datum 1927 Central U.S.



**Photo 13. View along Cave Creek Wash south of North Peak View Road, facing northeast/upstream (404999E, 3736154N).**

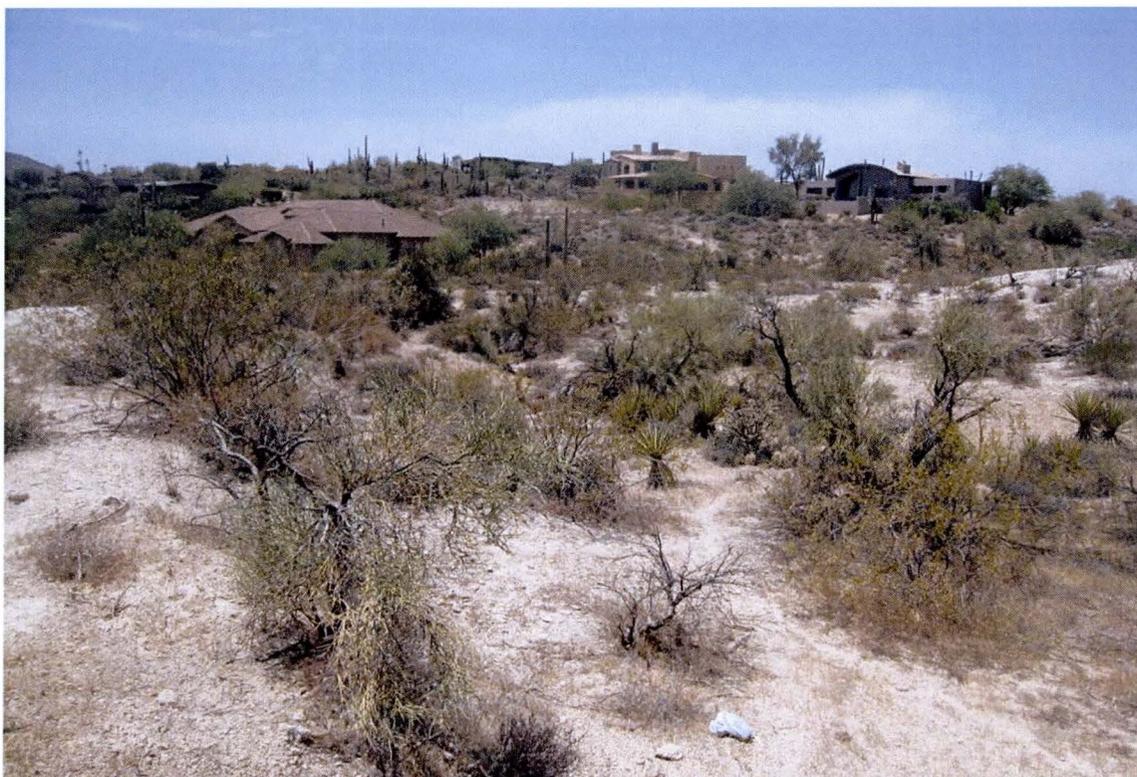


**Photo 14. View along Cave Creek Wash south of North Peak View Road, facing south/downstream (404999E, 3736154N).**

Note: Points are listed as Universal Trans Mercator coordinates in North American Datum 1927 Central U.S.

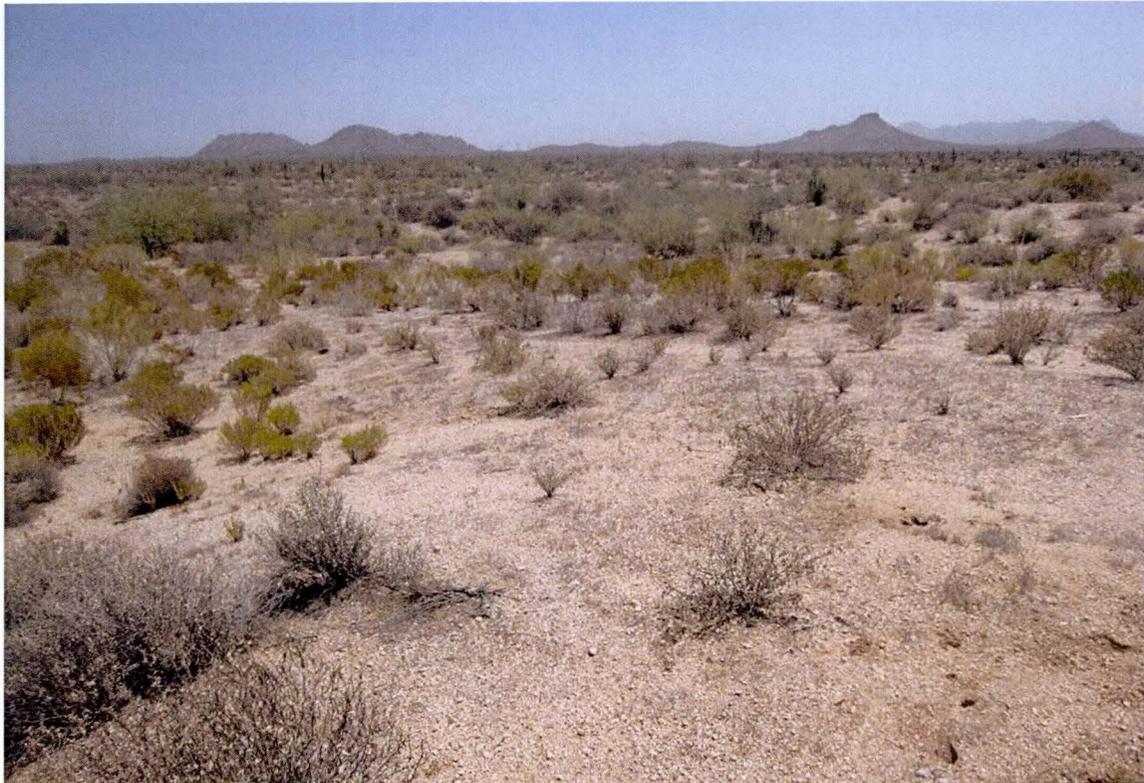


**Photo 15. View of Black Tank, a stock tank just east of Cave Creek Wash and just north of North Peak View Road, facing south (405652E, 3736158N).**



**Photo 16. View of the low-density development just north of Stagecoach Pass Road approximately 1 mile east of Tom Darlington Drive, facing northwest (415874E, 3741893N).**

Note: Points are listed as Universal Trans Mercator coordinates in North American Datum 1927 Central U.S.



**Photo 17.** View of the turpentine bush–triangle-leaf bursage–dominated Sonoran desertscrub south of Stagecoach Pass Road, facing southeast (419701E, 3741850N).



**Photo 18.** View of the buckhorn cholla–turpentine bush–dominated Sonoran desertscrub near the northeast end of the study area, south of Stagecoach Pass Road and 110th Way, facing south (422096E, 3741328N). Note the McDowell Mountains in the distance.

Note: Points are listed as Universal Trans Mercator coordinates in North American Datum 1927 Central U.S.



**Photo 19. View along the wash in the northeast portion of the study area, south of Stagecoach Pass Road and 110th Way, facing east/upstream (421732E, 3740720N).**



**Photo 20. View of the blue paloverde–crucifixion thorn–turpentine bush–dominated Sonoran desertscrub in the northeast portion of the study area, south of Stagecoach Pass Road and east of 99th Way, facing east (421443E, 3740188N).**

Note: Points are listed as Universal Trans Mercator coordinates in North American Datum 1927 Central U.S.



**Photo 21.** View of the saguaro–crucifixion thorn–buckhorn cholla–dominated Sonoran desert scrub in the northeast portion of the study area, south of Stagecoach Pass Road and east of 99th Way, facing east (421216E, 3739820N).



**Photo 22.** View of Arizona Game and Fish Department (AGFD) wildlife water (Paradise Valley #6) in the northeast portion of the study area, south of Stagecoach Pass Road and east of 99th Way, facing east (421175E, 3739642N).

Note: Points are listed as Universal Trans Mercator coordinates in North American Datum 1927 Central U.S.



**Photo 23. View of AGFD wildlife water (Paradise Valley #6), south of Stagecoach Pass Road and east of 99th Way, facing north (421175E, 3739642N).**



**Photo 24. View upstream along the desert wash in the northeast portion of the study area, south of Stagecoach Pass Road and east of 99th Way, facing northeast (420895E, 3739296N).**

Note: Points are listed as Universal Trans Mercator coordinates in North American Datum 1927 Central U.S.



**Photo 25. View upstream along a desert wash in the northeast portion of the study area, northeast of Pima and Lone Mountain roads, facing northeast (420414E, 3738504N). The marker is at or near the boundary of the McDowell Sonoran Preserve and indicates that the area is closed to camping and off-road vehicles.**



**Photo 26. View upstream along a desert wash in the northeast portion of the study area, northeast of Pima and Lone Mountain roads, facing northeast (420377E, 3738426N).**

Note: Points are listed as Universal Trans Mercator coordinates in North American Datum 1927 Central U.S.

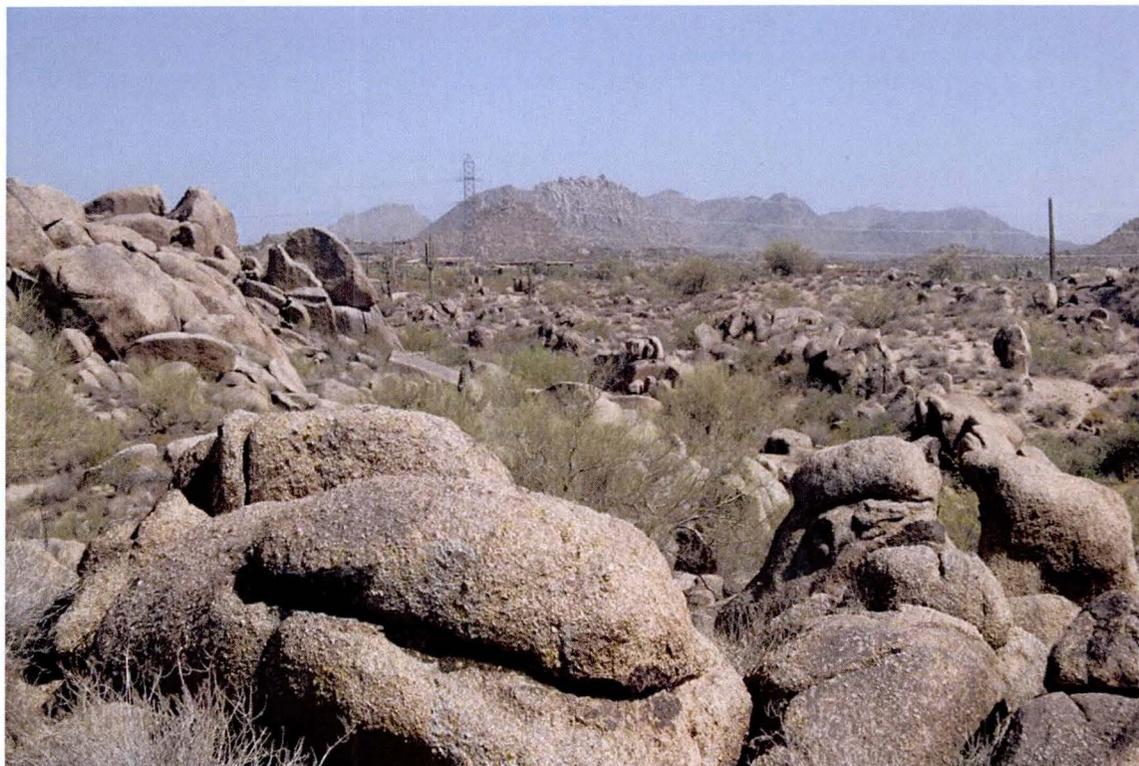


**Photo 27. View of creosotebush–triangle-leaf bursage–banana yucca–dominated Sonoran desertscrub in the northeast portion of the study area, northeast of Pima and Lone Mountain roads, facing east (420325E, 3738314N).**



**Photo 28. View of Paloverde–Mixed Cacti Series vegetation in the northeast portion of the study area, northeast of Pima and Lone Mountain roads, facing north (420087E, 3737938N). Note the fire scarring on the saguaro.**

Note: Points are listed as Universal Trans Mercator coordinates in North American Datum 1927 Central U.S.



**Photo 29.** View of granite boulder–strewn hills in the east portion of the study area, approximately 1 mile north of Dynamite Road, facing east (418942E, 3735987N). Note the McDowell Mountains in the distance.



**Photo 30.** View of granite boulder–strewn hills in the east portion of the study area approximately 1 mile north of Dynamite Road, facing east (418942E, 3735987N).

Note: Points are listed as Universal Trans Mercator coordinates in North American Datum 1927 Central U.S.



**Photo 31. View of Rock Tank, northeast of Pima and Dynamite roads, facing north (418760E, 3735695N).**



**Photo 32. View along a wash just north of Jomax Road, facing upstream (416416E, 3732231N).**

Note: Points are listed as Universal Trans Mercator coordinates in North American Datum 1927 Central U.S.

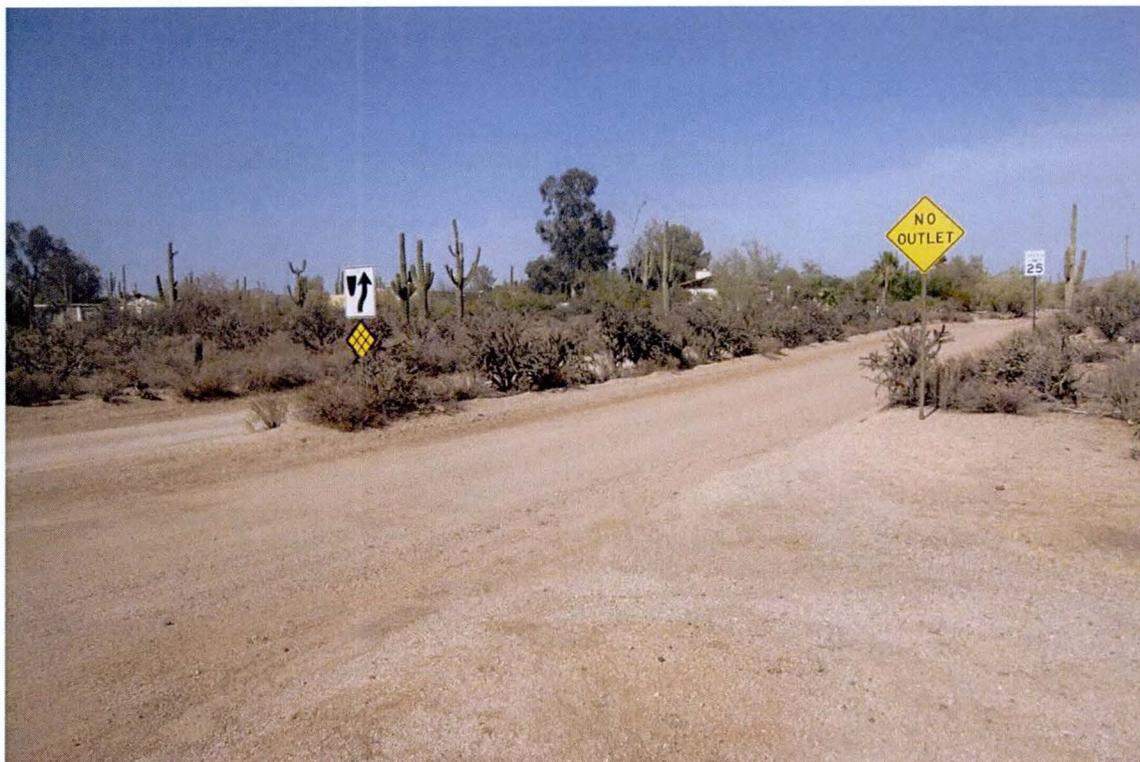


**Photo 33. View of the medium-density housing near Jomax Road at 74th Street, facing east (414609E, 3732326N).**



**Photo 34. View downstream along a minor wash just south of Jomax Road and 74th Street, facing south (412577E, 3732210N).**

Note: Points are listed as Universal Trans Mercator coordinates in North American Datum 1927 Central U.S.



**Photo 35. View of the medium-density housing near 64th Street and Red Bird Road, 0.25 mile north of Jomax Road, facing northeast (412621E, 3732637N).**



**Photo 36. View along a minor wash south of Dynamite Road, facing northeast (410389E, 3733682N).**

Note: Points are listed as Universal Trans Mercator coordinates in North American Datum 1927 Central U.S.



**Photo 37. View within the high-density neighborhood of San Marcos Manor, just north of Dynamite Road at 50th Street, facing northeast (409855E, 3733962N).**



**Photo 38. View of Pinnacle Peak at 40th Street, facing east (408963E, 3729204N).**