

Overview

The Sonoran Desert is an arid region covering portions of southwestern Arizona and southeastern California, as well as most of Baja California and the western half of the state of Sonora, Mexico. This is the hottest of our North American deserts, but a distinctly bimodal rainfall pattern produces a high biological diversity. Winter storms from the Pacific nourish many annuals such as poppies and lupines, while well-developed summer monsoons host both annuals and woody plants originating from the south. Freezing conditions can be expected for a few nights in winter.

Trees are usually well developed on the desert ranges and their bajadas. Often abundant on these well-drained soils are Little-leaf Palo Verdes, Desert Ironwoods, Catclaw and Saguaro. Understory consists of three, four or even five layers of smaller woody shrubs. The alluvial lowlands host communities of Desert Saltbush, Wolfberry and Bursage. On coarser soils, Creosote Bush and Bursage communities may stretch for miles. Where the water table is high, Honey or Velvet Mesquite form dense bosques or woodlands. Stream sides may be lined with riparian woodlands composed of Arizona Ash, Arizona Black Walnut, Fremont Cottonwood and various willows, with a dense understory of Arrow-weed, Seepwillow and Carrizo.

The master plan area includes both developed and natural settings, the degree to which natural habitats are available for wildlife species varies. There are at least twelve plant associations within the master plan area, with their occurrence generally corresponding to topography.

Stands of Creosote sometimes mixed with other species, predominate on areas of low relief in the south, whereas the plant communities grade into Arizona upland habitat as topographic relief increases to the north. The number of plant species and complexity of the plant communities is also highest in northern portions of the planning area. Live water and associated riparian gallery forest occurs along the lower portion of Morgan City Wash and the adjoining portion of the Agua Fria River.

The Triangle-leaf Bursage - Foothills Palo Verde association was by far the most common as it encompasses about 70% of the planning area.

Additional biological surveys will likely be necessary determine the status of threatened and endangered species in the area and to minimize or avoid development impacts to these species.

VEGETATION

The planning area is composed of upland Sonoran desert habitat with xeroriparian habitat along the various washes and river corridors. The only sensitive and biologically unique habitat within the area is the aquatic habitat and accompanying riparian gallery forest that occur along the lower reaches of Morgan City Wash. A protective buffer zone setback extending 2000 feet from top of bank on either side of the wash has been recommended in the *North Peoria Area Drainage Master Plan* to protect this unique area from impacts of future development. As development occurs, additional biological surveys will likely be necessary to determine the status of threatened and endangered species to minimize or avoid impacts to these species.

Several plant communities occur within the master plan area, with their occurrence generally corresponding to topography. Stands of creosote (*Larrea tridentata*), sometimes mixed with other species, predominate on areas of low relief in the south, whereas the plant communities grade into Arizona upland habitat as topographic relief increases to the north. The number of plant species and complexity of the plant communities is also highest in northern portions of the planning area. Live water and associated riparian gallery forest occurs along the lower portion of Morgan City Wash and the adjoining portion of the Agua Fria River. The Triangle-Leaf Bursage - Foothills Palo Verde association is by far the most common as it encompasses about 70% of the planning area.

The dominant vegetation along the xeroriparian washes includes:

- Blue Palo Verde (*Parkinsonia (Cercidium) floridum*),
- Velvet Mesquite (*Prosopis velutina*),
- Catclaw Acacia (*Acacia greggii*),
- Ironwood (*Olneya tesota*), and
- Desert Broom (*Baccharis sarothroides*).

Weed species include:

- Jimmyweed (*Isocoma wrightii*),
- Russian Thistle (*Salsola iberica*),
- Amaranthus (*Amaranthus spp.*), and
- London Rocket (*Sisymbrium irio*).

The desert floor in desert scrub communities often contains several grass species that typically include:

- Arizona Cotton Top (*Trichacne californica*),
- Curly Mesquite Grass (*Hilaria belangeri*),
- Fluff Grass (*Tridens pulchella*), and
- Three-awns (*Aristida spp.*).

The Upland communities share many species with adjacent subdivisions. These include:

- Blue Palo Verde,
- Creosote Bush,
- Velvet Mesquite,
- Prickly Pear Cactus (*Opuntia engelmannii*),

Russian Thistle,
Barrel Cactus (*Ferocactus wislizenii*),
Chain Fruit Cholla (*Opuntia fulgida*),
Little-leaf Palo Verde (*Cercidium microphyllum*),
Desert Broom,
Saguaro (*Carnegiea gigantea*),
Graythorn (*Ziziphus obtusifolia*),
Triangle-leaf Bursage,
Foothill Palo Verde (*Parkinsonia microphylla*), and
Western Honey Mesquite (*Prosopis glandulosa* var. *torreyana*)

Brittlebush Association. The Brittlebush (*Encelia farinosa*) association occurs throughout the planning area but is largely restricted to exposed, rocky hills or slopes. This association is especially common on steep, west- to south-facing slopes of basalt rocks and boulders. The species composition of this association is similar to that of the Triangle-leaf Bursage - Foothills Palo Verde association. The most notable difference between these two associations is that Brittlebush replaces Triangle-leaf Bursage in the Brittlebush association. Other plant species that tend to grow in rocky sites are also more common in the Brittlebush association. These species include Parish Vigiera (*Viguiera parishii*), Ocotillo, Compass Barrel Cactus, Desert-Lavender (*Hyptis emoryi*), and California Trixis (*Trixis californica*).



Triangle-leaf Bursage - Foothills Palo Verde Association. This plant association is nearly ubiquitous within central portions of the project area, except in the larger washes, and encompasses nearly 70% of the planning area. It is characterized by moderately dense stands of: Triangle-leaf Bursage (*Ambrosia deltoidea*); Foothills Palo Verde (*Cercidium microphyllum*) occurs at a lower density as scattered, evenly-spaced individuals. Taller shrubs, such as Creosote Bush (*Larrea tridentata*), Jojoba (*Simmondsia chinensis*), Wolfberry (*Lycium* spp.), Cholla (*Cylindropuntia* spp.), Ocotillo (*Fouquieria splendens*), Ephedra (*Ephedra fasciculata*), and Compass Barrel Cactus (*Ferocactus cylindraceus*), are also often present. Trees such as desert Ironwood (*Tesota olneya*) and Allthorn (*Canotia holocantha*) are occasional.



Flattop Eriogonum Association. The Flattop Eriogonum (*Eriogonum fasciculatum*) association dominates the higher hills at the northwestern end of the planning area. As one moves south in the project area, this community becomes increasingly restricted to north to northeast-facing slopes, i.e., slopes that are slightly cooler and more mesic. This association is restricted to isolated locales on the higher peaks south of Highway 74. The species composition of this association is similar to that of the Triangle-leaf Bursage - Foothills Palo Verde association. However, a moderate number of plant species in the Flattop Eriogonum association are less drought-tolerant than those in the Triangle-leaf Bursage - Foothills Palo Verde association. These less drought-tolerant plant species include Bush-Muhly (*Muhlenbergia porteri*), Big Galleta (*Pleuraphis rigida*), Slender Janusia (*Janusia gracilis*), Parish Viguiera, and jojoba.



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Creosote Bush Association. The Creosote Bush association dominates in the plains and silty benches. Consequently, this is the most common plant association in, and is generally restricted to, the southern part of the project area. The composition of the Creosote Bush association varies from single-species stands of Creosote Bush to sites that represent transitional stages to the Triangle-leaf Bursage - Foothills Palo Verde association. The Creosote Bush association is often dissected by large washes.

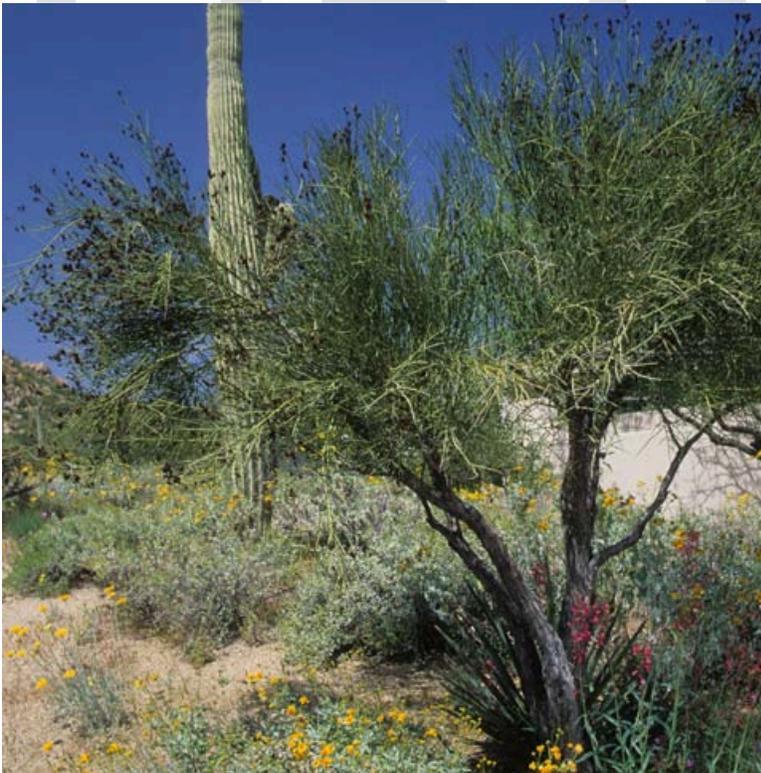


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Velvet Mesquite Association. Moderately dense stands of Velvet Mesquite (*Prosopis velutina*) border the larger washes. This plant association is most notable within Morgan City Wash. Species composition of this association is similar to that of the Blue Palo Verde - Desert Ironwood association.



Creosote Bush - Allthorn Association. This association is restricted to the white gypsum soils northeast of Twin Buttes and to the northwest of Saddleback Mountain. Plant cover is low in areas occupied by this association. Characteristic plant species in this association include Allthorn (*Koeberlinia spinosa*), Menodora (*Menodora scabra*), Ratany (*Krameria erecta*), and Shrubby Coldenia (*Tiquilia canescens*).



Jojoba - Mixed Scrub association. The Jojoba – Mixed Scrub association is restricted to steep north to northeast-facing rocky slopes, mostly along larger washes. The species composition of this association is similar to that of the Flattop Eriogonum association. However, the structure differs noticeably because plants in the Jojoba – Mixed Scrub association occur at a higher density and are larger in stature.

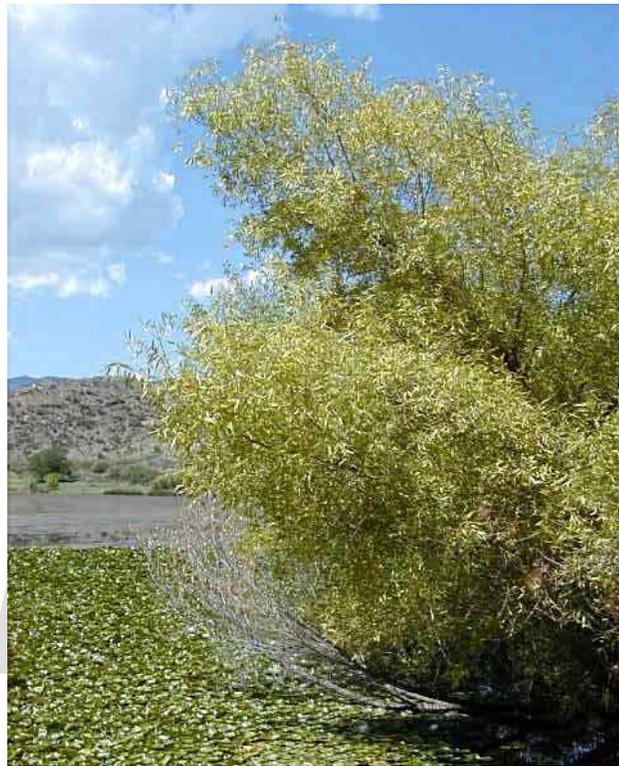
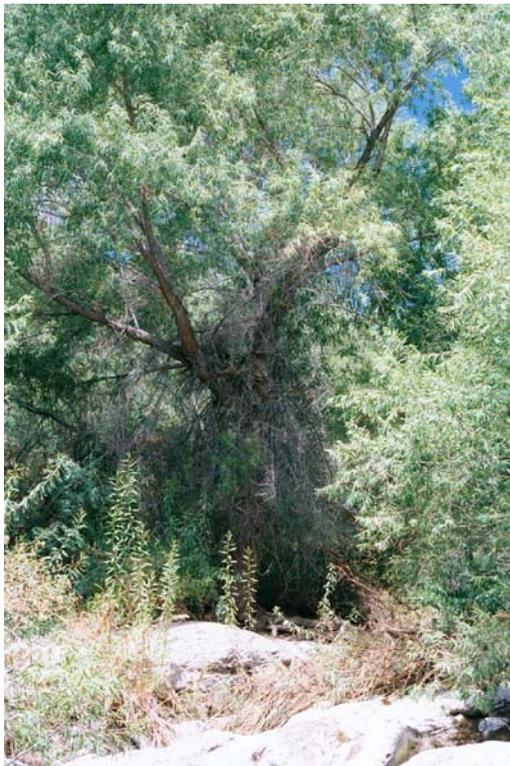


Blue Palo Verde - Desert Ironwood Association. The Blue Palo Verde - Desert Ironwood association is the primary plant association that borders the larger washes throughout the Sonoran Desert in Arizona. The structure and species composition of this association vary locally, however, primarily because of differences in soil moisture. Common subdominant species within the planning area include Catclaw Acacia (*Acacia greggii*), Whitethorn Acacia (*Acacia constricta*), Gray-Thorn (*Zizyphus obtusifolia*), Wolfberry, Velvet Mesquite, Desert-Willow (*Chilopsis linearis*), Desert Broom (*Baccharis sarathroides*), and Burro Bush (*Hymneoclea salsola*, *H. monogyra*). At sites where soil moisture is higher, Netleaf Hackberry (*Celtis reticulata*), Arrowweed (*Pluchea sericea*), Salt Cedar (*Tamarix chinensis*), Seep Willow (*Baccharis salicifolia*), and rarely Goodding Willow (*Salix gooddingii*) also occur.



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Goodding Willow Association. The Goodding Willow association is restricted to Morgan City Wash from its confluence with the Agua Fria River to about one kilometer upstream. Parts of this area include a mature woodland. Goodding Willow is the dominant tree species throughout this area, while Salt Cedar is less common. Live water occurs throughout this area, and arises from an upstream spring. Several species of wetland herbaceous perennials also occur in this association and include Bulrush (*Scirpus americanus*), Spikerush (*Eleocharis parishii*), and Cattail (*Typha dominguensis*). Plant species further away from the water are similar to those found in the Blue Palo Verde - Desert Ironwood association.



White Bursage Association. Within the planning area, the White Bursage (*Ambrosia dumosa*) association occurs only on white gypsum soils on the western slope and northwestern base of the peaks to the west of Twin Buttes. The species composition of this plant association is similar to that of the Creosote Bush – Allthorn association.



Saltbush seeded. Several areas along Castle Hot Springs Road have been disturbed and subsequently seeded with several species of Saltbush - Fourwing Saltbush (*Atriplex canescens*) and Cattle Saltbush (*A. polycarpa*) are the two most abundant species of saltbush in these areas.



Residential Development. The diversity and density of plant and wildlife species in a residential development depend on the intensity of the human activity and the type and structure of the vegetation present. Residential and commercial development with intact native vegetation and relatively low human populations can support many of the same wildlife species that the vegetative communities within the study area support.

Xeroriparian Habitat.

Riparian scrub is also known as xeroriparian mixed scrub, and occurs as a linear corridor of sparse to dense shrubs with trees lining washes and growing in floodplains. Xeroriparian areas, on average, have greater availability of surface and subsurface water than areas not associated with washes. As a result, xeroriparian washes tend to have a higher density and diversity of vegetation and often larger individuals of a particular plant species than adjacent upland areas. The greater abundance of resources provided by the vegetation increases the value of riparian communities over the adjacent upland communities for many species. The vegetation species in the xeroriparian habitat include Ironwood, Saguaro, Mesquite, Blue Palo Verde, Cholla, Ocotillo, and Desert Broom.

The structural and species diversity provide many types of food, cover, and shelter opportunities for wildlife. The banks of the washes and drainages provide shade and burrow sites. In addition, the washes serve as wildlife travel corridors. Movement of wildlife species through these corridors ensures that wildlife can survive in isolated habitat and in the region overall. Common mammals in xeroriparian communities may include Cactus Mouse (*Peromyscus eremicus*), Mule Deer (*Odocoileus hemionus*), Big Brown Bat (*Eptesicus fuscus*), Coyote (*Canis latrans*), and Javelina (*Tayassu tajacu*). Some characteristic birds of this community include Gambel Quail (*Callipepla gambelii*), Gila Woodpecker (*Melanerpes uropygialis*), Western Kingbird (*Tyrannus verticalis*), White-winged Dove (*Zenaida asiatica*), and the Verdin (*Auriparus flaviceps*). Coachwhip snakes (*Masticophis flagellum*), Western Spadefoot toads (*Scaphiopus hammondi*), and Collared lizards (*Crotophytus collaris*) are a few of the reptile and amphibian species that may be found in xeroriparian communities.

Development of areas within the master plan will result in numerous direct and indirect impacts to the biological community. One indirect impact will be changes in the frequency and amount of run-off that is received by washes in the area. This in turn will affect the long-term composition and stature of the xeroriparian vegetation along these washes. Two alternative scenarios for changes to the pattern of run-off are discussed herein: 1) a decrease in the frequency and amount caused by diverting run-off to storm drains or similar removal systems, and 2) an increase in the frequency and amount, such as would be caused by diverting large volumes of additional run-off into the washes, or by retaining water in the washes for longer intervals. This latter scenario would be caused by the large increase in non-porous surfaces within the planning area (i.e., roads, houses, and other surfaces).

Decreasing the frequency and amount of run-off into the washes would probably manifest few changes in the xeroriparian plant community over the short-term, but could dramatically alter

the vegetation of these washes over the long-term. The predicted long-term changes under such a scenario have been detailed relative to changes in the terrace vegetation along the Colorado River in Grand Canyon National Park following construction of Glen Canyon Dam. Based on these studies, decreasing the frequency and amount of flow would effect few short-term changes for washes within the planning area. However, germination and establishment of new xeroriparian plants would likely decrease proportionate to the decrease in flow. Consequently, adult trees would senesce and die over the long-term, and these individuals would not be replaced by seedlings. Large decreases in the amount of flow could lead to the slow demise of the xeroriparian plant community.

In contrast, the scenario of increasing the frequency and amount of run-off would likely result in substantial short- and long-term changes to the xeroriparian plant community. These changes would include increasing the size of the xeroriparian plant community as well as plant density. The magnitude of change to this plant community would likely be proportionate to the increase in water volume. Additionally, several plant species that are characteristic of more mesic habitats could become more common. These plant species include Burro Bush, Seepwillow, Desert Broom, possibly Goodding Willow. It should be noted that these predictions do not apply to increases in run-off volume that would be sufficient to induce scouring and significant erosion of the washes. Under such a scenario, scouring would deepen the washes, and the adjacent terraces could be eroded, thus also widening the wash. Moreover, run-off volumes that are sufficient to scour terrace areas could negatively impact existing xeroriparian vegetation. Frequent occurrence of such events might preclude re-establishment of the habitat.

WILDLIFE

The Sonoran Desert is rich in animal life as well, with many species in all groups derived from tropical and subtropical regions. The master plan area supports an abundance of wildlife that is typical of Sonoran Desert habitats (see Brown 1982). Analogous to the pattern exhibited by plants, the number of animal species is lowest in the less complex low-relief habitats in the south and is highest throughout the topographically diverse Hieroglyphic Mountains area. In addition, numerous riparian-obligate and riparian-facultative species use the riparian forests along Morgan City Wash and the Agua Fria River .

Both the Agua Fri River and New River serve as valuable wildlife corridors and water source for wildlife of all sizes. Due to current and historical cattle grazing, there are numerous stock tanks throughout the area. Stock tanks are generally intended for cattle but are also valuable watering areas for wildlife. Catchments are valuable to all species of wildlife that inhabit this area and, if they are negatively impacted either directly through destruction resulting from home or road construction or indirectly by encroaching development, should be relocated to an area that will be preserved. Though the plant density associated with some of these tanks is higher than normal, many have been degraded due to wildcat dumping, off-road vehicles, target shooting, and other human activities. In spite of this degradation, wildlife species using these areas include Javelina (*Tayassu tajacu*), Coyote (*Canis latrans*), Bobcat (*Felis rufus*), Feral Burros (*Equus asinus*), and numerous species of shore and wading birds. The associated vegetation provides valuable cover for nesting, movement corridors for bird and mammal species, and habitat for various species of amphibians.

Formal wildlife surveys have not been conducted for this master plan however, wildlife typical to the planning area include: Desert Cottontail (*Sylvilagus audubonii*), Black-tailed Jackrabbit (*Lepus californicus*), Mourning Dove (*Zenaida macroura*), White-winged Dove (*Z. asiatica*), Gambel’s Quail (*Callipepla gambelii*), Turkey Vulture (*Cathartes aura*), Javelina (*Tayassu tajacu*), Pack Rat (*Neotoma spp.*), and Northern Mockingbird (*Mimus polyglottos*).



Two special status species, Sonoran Desert Tortoise (*Gopherus agassizii*) and Lowland Leopard Frog (*Rana yavapaiensis*) have been known to occur within the master plan area. Two additional species that are listed as endangered, Southwestern Willow Flycatchers (*Empidonax traillii extimus*) and Lesser-long Nosed Bats (*Leptonycteris curasoae yerbabuena*), are not currently known to occur in the area, but suitable and sufficient habitat exists to support individuals of both species. According to the *Wittmann Area Drainage Master Plan*, there are fourteen threatened, endangered, and candidate species are listed for Maricopa County. Two endangered species (Lesser Long-nosed Bat and the Bald Eagle) have been identified as having the potential to occur within the master plan area.

Common Mammals

The extremely arid nature and considerable summer heat is a formidable obstacle to most wildlife attempting to live in the desert, nevertheless the general region has displayed several well-adapted species. With regard to the larger mammalian species, the low mountains and hills to the north and west provide a limited habitat for the well-adapted Coyote. The Kit Fox (*Vulpes macrotis*) and the Gray Fox (*Urocyon cinereoargenteus*), while not observed in the general region recently, have inhabited it in the recent past. The Javelina once was a common inhabitant of the general region, but is now rare and restricted to higher elevations generally above 1,200 feet.

Varieties of Raccoons may inhabit the region, including the Ringtail (*Bassariscus astutus*), and varieties of skunk can be observed that may include the Striped Skunk (*Mephitis mephitis*), and the Spotted Skunk (*Spilogale putorius*). Several varieties of hares and rabbits can also be found, including the Antelope Jackrabbit (*Lepus alleni*), the Black-tailed Jackrabbit, and the Desert Cottontail.

Due to the high diurnal temperatures, the most frequent mammals are burrowing rodents. The rodents identified within the region include squirrels such as the Round-tailed Ground Squirrel (*Xerospermophilus tereticaudus*), the White-tailed Antelope Squirrel (*Ammospermophilus leucurus*), and the Rock Squirrel (*Otospermophilus variegatus*). The only type of gopher known to inhabit the general region is the Valley Pocket Gopher (*Thomomys bottae*).

There are several types of kangaroo rats and pocket mice known to inhabit the region, including the Desert Pocket Mouse (*Chaetodipus penicillatus*), the Silky Pocket Mouse (*Perognathus flavus*), the Little Pocket Mouse (*Perognathus*



longimembris), the Arizona Pocket Mouse (*Perognathus amplus*), and Bailey’s Pocket Mouse (*Chaetodipus baileyi*). In addition, Merriams’ Kangaroo Rat (*Dipodomys merriami*), and the Desert Kangaroo Rat (*Dipodomys deserti*) have been observed in the past.

Many species of native rats and mice inhabit the region, including several species of grasshopper mouse; many varieties of the common mouse, a few varieties of the cotton rat, several species of the wood rat, and in the recent past, the muskrat. With human occupation come introduced rodent species, and in the Project Area these may now include the Norway Rat (*Rattus norvegicus*), the Black Rat (*Rattus rattus*), and the house mouse (*Mus musculus*). Finally, two varieties of bat have been observed within the region, including the California Leaf-nosed Bat (*Macrotis californicus*) and the California Myotis (*Myotis velifer*) - or Plain-nosed Bat.

Common Birds

Avian species diversity generally increases as vegetation becomes denser. Common species include the Turkey Vulture (*Cathartes aura*), Common Raven (*Corvus corax*), Phainopepla (*Phainopepla nitens*), Cactus Wren (*Campylorhynchus brunneicapillus*), Gila Woodpecker (*Melanerpes uropygialis*), Gambel’s Quail (*Callipepla gambelii*), Mourning Dove (*Zenaida macroura*), red-tailed hawk (*Buteo jamaicensis*), and the American Roadrunner (*Geococcyx californianus*).



Additional species within the region include the Burrowing Owl (*Athene cunicularia*), the Gila Woodpecker (*Melanerpes uropygialis*), the Gilded Flicker (*Colaptes chrysoides*), Wieds’ Crested Flycatcher (*Myiarchus tyrannulus*), the White Winged Dove (*Zenaida asiatica*), and Costa’s Hummingbird (*Calypte costae*). Raptors that might be observed include the Lesser Nighthawk (*Chordeiles acutipennis*), Harris’ Hawk (*Parabuteo unicinctus*), the Elf Owl (*Micrathene whitneyi*), and the Verdin (*Auriparus flaviceps*).



Two species are listed as endangered (the Southwestern Willow Flycatcher and Lesser-long nosed bat) are not currently known to occur in the area, but suitable and sufficient habitat exists to support individuals of both species.

Common Amphibians and Reptiles

Varieties that occur within the region include the Desert Iguana (*Dipsosaurus dorsalis*) and the Gila Monster (*Heloderma suspectum*), snakes such as the Coachwhip (*Masticophis flagellum cingulum*), the Bull Snake (*Pituophis catenifer sayi*), the Coral Snake (*Micruroides euryxanthus*), the Western Whiptail (*Aspidoscelis tigris*), the Banded Sand Snake (*Chilomeniscus cinctus*), and several varieties of rattlesnake



Crotalus spp.). Several varieties of toad can be found throughout the general region, as well as several species of sand adapted lizards including the Fringe-toed Lizard (*Uma notata*), and the Flat-tailed Horned Lizard (*Phrynosoma mcallii*), with the more rocky and bajada areas being occupied by other lizard species including the Brush Lizard (*Urosaurus graciosus*), the Southern Desert Horned Lizard (*Phrynosoma platyrhinos*), and the Western Whiptail (*Cnemidophorus tigris*). Other species that may be present include the Tree Lizard (*Urosaurus ornatus*), Western Banded Gecko (*Coleonyx variegatus*), Desert Tortoise (*Gopherus agassizii*) in the rocky outcropping areas of the foothills, Gila Monster (*Heloderma suspectum*), Common Kingsnake (*Lampropeltis getula*), Western Diamondback Rattlesnake (*Crotalus atrox*), and Gopher Snake (*Pituophis melanoleucus*). Exotic bullfrogs (*Rana catesbeiana*) and other amphibians associated with stock tanks are likely to occur within the planning area.



Wildlife Corridors

Washes provide landscape features that connect large tracts of isolated habitat across fragmented and at times barren terrain and are commonly referred to as wildlife corridors. Movement of wildlife species through these corridors ensures that wildlife can survive in isolated habitat and in the region overall. Wildlife corridors provide wildlife species with concealment for foraging activities, seasonal movement, and juvenile dispersal. The natural connectivity afforded by the wildlife corridors maintains genetic diversity for plant and animal wildlife species, as well as healthy populations in general. The master plan area contains major rivers and many smaller washes that contain xeroriparian habitat that function as a wildlife corridor for many species of birds, reptiles, and mammals. In addition, the Central Arizona Project Canal also functions as a wildlife corridor.

Threats to Wildlife and Wildlife Habitat

Important threats to Arizona’s wildlife and wildlife habitat are being identified as part of the initial development of the State Wildlife Action Plan (SWAP, formerly known as CWCS). Individual threats have been assessed for the magnitude and urgency of their impacts on Arizona’s wildlife and wildlife habitats. Many have been found to have a high level of urgency and or magnitude in one or more vegetation types.

The Arizona Department of Game and Fish has mapped the location of the threats that were identified in the 2005 SWAP. The Department realized that some threats occurred in the same areas as other threats and that some threats were interrelated. The following includes a description of each threat.

Mining. This threat includes impacts associated with new roads, groundwater pumping, and water pollution associated with mineral districts; noise and light pollution created from mining activity; mining contaminants from wastewater, runoff, heavy metals, and mine tailings; and mining equipment left as litter/dumping when the mining activity is complete. Analysis indicates a linearly decreasing threat intensity from the center of a mine up to 1 mile away. All mines are considered equal whether active or inactive, including past, present, and future open pit and underground.

Drilling. This threat includes the impacts associated with light and noise pollution from drilling for fossil fuels, CO₂, methane, helium, etc. All wells, including test and other non-producing wells, are equal and treated as a “high” threat designation. The data and analysis effectively places the highest threat in areas with a high density of the wells. The area of impact extends up to two miles from the well.

Grazing / Domestication of Wildlife. This threat includes the infrastructure that supports grazing, such as ranch roads, corrals, livestock waters, and fences. This generally occurs with Bureau of Land Management (BLM), US Forest Service (USFS) and Arizona State Lands Department (ASLD) grazing allotments and private property. Although there are different management practices by different agencies, the difference in impacts are a result of different climatic regimes and the presence of sensitive landscape elements such as riparian areas. The lower the precipitation, the higher the weight of this threat. In addition, the impact to riparian areas is twice that of upland areas.

This threat also refers to escaped or abandoned domestic pets, farm stock, and equines, and includes horses, cats, dogs, burros, hogs, goats, and domestic sheep. The threat includes the impacts from escaped domesticated wildlife as a result of ranching, game farming, and from keeping native wildlife as pets. Some of the concerns about domestication of wildlife involve the potential for disease transmission (e.g., fish hatcheries, aquaculture, desert tortoise adoption), or the fear of hybridization with native wildlife (e.g., domestic wolves). Influence from this threat is strongest at the point location and diminishes up to five miles away.

Dams / Reservoirs / Impoundments. The downstream threat from dams and reservoirs is dependent on the size of the drainage to the dam. If the drainage area to the dam is greater than 50 square miles, the threat was assumed to continue for a great extent (for example, the impact from Hoover Dam extends from the dam to the Colorado River delta at the U.S. / Mexico border). If the drainage area to the dam is less than 50 square miles, the threat continued downstream to the first confluence with another watercourse.

Canals / Pipelines. Arizona has a vast network of water delivery systems including various irrigation district canal networks, the Salt River Project (SRP) delivery system in central Arizona, and the Central Arizona Project (CAP) that delivers water from the Colorado River to central Arizona. Water delivery systems (canals, ditches or irrigation

delivery) are a threat to wildlife as movement barriers, through the spread of herbicides, pesticides and contaminants that can cause impaired water quality status). They also facilitate the spread of invasive exotic aquatic animals (such as nonnative fish and quagga mussels) and invasive exotic aquatic plants (such as giant salvinia and golden algae). Small regional irrigation systems and canal systems are less of a barrier to wildlife primarily due to their smaller size, lack of fencing or urban locations. However these systems still create movement conduits for aquatic plants and animals.

Streambank Alteration / Channelization. This threat occurs where stream/river banks have been altered (e.g. rip-rap, soil cement, dredging) in an effort to confine a natural drainage to a particular channel to alleviate overbank flooding. The threat includes places where channelization has already occurred and where it likely could occur in the future. All streams and rivers within 30 miles of the center of Phoenix and large washes within the Phoenix metropolitan area were considered to be channelized or altered.

Groundwater Depletion & Springhead Use. The Department used the simplest model possible and assumed that all surface water is dependent to a certain extent on ground water. Therefore all streams, springs and washes could be affected by ground water pumping. Wildlife could be affected either through diminishing surface water availability or degradation of habitat due to the effect of the lowering water table on hydrophytes and phreatophytes. The influence of diminishing surface water in perennial and intermittent streams and springs is assumed to affect wildlife up to three miles away since this is the distance large ungulates have been shown to travel to water. The effect of ground water pumping on xeroriparian washes was assumed to affect wildlife up to a distance of one mile.

Loss of Keystone Species. All species play an integral role in the functioning of ecosystems however, keystone species have a disproportionately high impact. Keystone species contribute to ecosystem function in a unique and significant manner through their activities. Their removal initiates changes in ecosystem structure and often a loss of diversity.

The loss of top predators can precipitate ecological chain reactions that lead to profound degradation and species loss. Gray wolves (*Canis lupus*) in Yellowstone are an example in which the extirpation of a large carnivore leads to the ecological release of large terrestrial ungulates and other herbivores, causing changes in vegetation structure, species composition, and diversity.

Symbiotic interactions between species are critical to maintain species diversity. For example the relationship between the whitebark pine (*Pinus albicaulus*) and Clark's nutcracker (*Nucifraga columbiana*). The Clark's nutcracker is strongly dependent on the seeds of the whitebark pine for a food source, and the pine depends on the nutcracker for the dispersal of its seeds for expansion and new growth. Similarly, the Cactus Wren feeds on Saguaro blossoms, digests the seeds while nesting in mesquite or palo verde trees. The saguaro seeds germinate in the shade of the trees and are protected from

the intense sun in the early decades of the growth of the saguaro. As the trees decline, the saguaros become dominant and bloom, and the cycle continues.

Species whose activities affect and enhance physical or biological habitat structure have been referred to as “ecological engineers”. Ecological engineers significantly modify their habitat in ways that affect local species diversity. Examples of ecological engineers include beavers (*Castor canadensis*) that create wetlands by building dams in streams, mound building by termites, and burrowing and grazing by prairie dogs (*Cynomys* spp.).

Harvesting / Collecting Animals and/or Plants. Game and Fish experts have concluded that the harvest/collection of wildlife is a threat to only a few species: *Rosy boas*, *ridge-nosed rattlesnakes*, *banded rock rattlesnake*, *twin-spotted rattlesnake*, *massasauga*, *green rat snake*, *brown vine snake*, *New Mexico milk snake*, *lowland burrowing treefrog*, *box turtle*, *Sonoran desert tortoise*, *Bezy’s night lizard* and *Arizona night lizard*.



The threat to green rat snake, milk snakes and massasauga, is mainly from road hunting, so the threat for these species was limited to roads at a 328 feet (100 meter) distance. Roads are considered a higher threat for all species.

Collecting plants includes illegal collecting, poaching and overharvest through legal take in specific areas and or particular time frames. This type of take occurs primarily in desert regions with species of cactus being the primary targets of interest, but can also include other desert plants, especially succulents such as saguaros, yuccas, and ocotillos.

Rural Development. The threat of rural development is present for all private and state trust lands, and any land marked for disposal by BLM throughout the state, but is higher near existing population centers and travel corridors. Urban areas have an impact up to 5 miles. Road density is considered additive thus the highest impacted areas are near existing urban centers, near large travel corridors, and on private land.

Landfills and Dumps. Landfills are various sizes thus an arbitrary radius of influence of 5 miles around each point was chosen as the distance to which a landfill had the potential to impact wildlife.

Air Traffic Corridors / Overflights, Military Bases, Defoliation, Munitions Testing. This threat includes all noise or light pollution associated with air traffic corridors or overflights. This threat consists of the following impacts: Military airports plus primary airports have an impact up to 2 miles because noise and light occurs outside of the military land itself.

Illegal Dumping / Littering. This threat includes trash that is thrown out or blown out of vehicles, large illegal dumping sites around cities, trash left by recreationists, trash that ends up in lakes and streams from recreationists or from rainfall events and floats downstream, etc. Historically illegal dumping has occurred along river corridors in

several areas. Major roads (interstates, highways, and major arterials), lakes, major rivers and minor streams have an impact up to 1 mile.

Roads for Motorized Vehicles. Ecological effects of roads are the direct impact within the route corridor (loss of habitat, road kill mortality), indirect effects distributed radiating outward from the route corridors (e.g. impacts to home range of wildlife), and dispersed landscape effects resulting from cumulative effects of multiple routes across the landscape (e.g. habitat fragmentation, population isolation). Evaluation of this threat includes the threat from herbicide or pesticide treatments along roads and noise and light pollution along roads. The average distance roads were found to impact wildlife is 1/3 of a mile.

Motorized Recreation Off-Trail. Includes the impacts of any motorized travel off-trail including but not limited to the use of All Terrain Vehicles (ATV) and Off Highway Vehicles (OHV). OHV hot spots (includes perennial/intermittent riparian areas and long term visitor areas). OHV hotspots defined as areas of high trail proliferation and traffic volume to the extent that impacts to wildlife and habitat extend beyond the footprint of the trail. Impacts include habitat destruction, fragmentation, and wildlife disturbance. The greatest amount of OHV activity is found in close proximity to urban areas, where day or weekend OHV users can quickly access public lands via paved and dirt roads. Many of the OHV hotspots fall within close proximity of urban areas. A 5 mile impact zone is included around development.

Off-Range Recreational Shooting. This wildlife threat has the potential to occur on all accessible public and private lands, and is closely tied to motorized vehicle access and urban and rural development. Land ownerships open to the public, where recreational shooting is not prohibited by law or by federal or county land use designations will be included in this threat. A 5 mile impact zone is included around development (co-incident with the motorized recreation off-trail impact zone).

Dispersed Camping. Dispersed camping occurs statewide on State Trust Land and public lands (forest, BLM, some military, national refuges, park service, etc.), primarily along roadsides. The direct impacts are approximately 200 feet along rural and primitive roads on public lands, and then increased a distance of ¼ mile from the 200-foot buffer. This threat includes all noise and light pollution associates with dispersed camping.

Lead Shot / Fishing Line. Lead in the environment can result from spent lead from firearms, as lead fragments in legally taken game animals that are not retrieved or in parts discarded from game animals, through mining and smelting activities, at firearms training facilities, as well as in trace amounts throughout the environment. It affects many wildlife species across the state. Lead can also be a result of fishing line pollution is associated with water bodies and all places where angling occurs. Discarded or lost fishing line often causes entanglement or ingestion by riparian birds and raptor species associated with aquatic systems. It is a higher threat in those places where angler use days are high.

ENDANGERED, THREATENED, AND SENSITIVE SPECIES IN THE PLANNING AREA

The Endangered Species Act (ESA) provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The ESA's primary goal is to prevent the extinction of imperiled plant and animal life, and secondly, to recover and maintain those populations by removing or lessening threats to their survival. To be considered for listing, the species must meet one of five criteria:

1. There is the present or threatened destruction, modification, or curtailment of its habitat or range.
2. An overutilization for commercial, recreational, scientific, or educational purposes.
3. The species is declining due to disease or predation.
4. There is an inadequacy of existing regulatory mechanisms.
5. There are other natural or manmade factors affecting its continued existence.

The U.S. Fish and Wildlife Service (USFWS) maintains a list of endangered and threatened species. Endangered and threatened species include birds, insects, fish, reptiles, mammals, crustaceans, flowers, grasses, and trees. The ESA prohibits any action, administrative or real, that results in a "taking" of a listed species, or adversely affects habitat. The Arizona Ecological Services Office (AES) of the USFWS maintains a list of threatened, endangered, proposed, and candidate species known to occur within each Arizona county. The AES website (<http://www.fws.gov/southwest/es/arizona/>) can be accessed to obtain a list of species listed for Maricopa County. In addition, the Arizona Game and Fish Department (AGFD) Environmental On-Line Tool (<http://www.azgfd.gov/hgis/>) can also be accessed to obtain a list of threatened and endangered species that have been observed within the master plan area.

Migratory bird species (other than exotic species) also receive legal protection under the Migratory Bird Treaty Act of 1918.

Many of Arizona's native plants are protected by law. These protected plants may not be removed from any lands, whether private or public, without the permission of the land owner and a permit from the Arizona Department of Agriculture. There are four Protected Native Plant Categories:

1. Highly Safeguarded – These plants are threatened for survival or are in danger of extinction.
2. Salvage Restricted – This large group of plants are subject to damage and vandalism.
3. Salvage Assessed – This much smaller group of plants have enough value if salvaged to support the cost of salvaging.
4. Harvest Restricted – Also a smaller group, these plants are protected due to the fact that they are subject to excessive harvesting because of the intrinsic value of products made with their wood or fiber..

The category lists and the procedures for obtaining permits for harvest, salvage, removal, and transport can be viewed on the Arizona Department of Agriculture's website at <http://www.azda.gov/ESD/nativeplants.htm>.

Endangered Species located within Maricopa County, Arizona

US Fish and Wildlife Service, January, 2009

Common Name	Scientific Name	Species
California Least Tern	<i>Sterna antillarum browni</i>	Bird
Mexican Spotted Owl	<i>Strix occidentalis lucida</i>	Bird
Southwestern Willow Flycatcher	<i>Empidonax traillii extimus</i>	Bird
Yellow-Billed Cuckoo	<i>Coccyzus americanus</i>	Bird
Yuma Clapper Rail	<i>Rallus longirostris yumanensis</i>	Bird
Desert Pupfish	<i>Cyprinodon macularius</i>	Fish
Gila Topminnow (Incl. Yaqui)	<i>Poeciliopsis occidentalis</i>	Fish
Razorback Sucker	<i>Xyrauchen texanus</i>	Fish
Roundtail Chub	<i>Gila robusta</i>	Fish
Woundfin	<i>Plagopterus argentissimus</i>	Fish
Arizona Cliff-Rose	<i>Purshia subintegra</i>	Plant
Lesser Long-Nosed Bat	<i>Leptonycteris curasoae yerbabuenae</i>	Mammal
Sonoran Pronghorn	<i>Antilocapra americana sonoriensis</i>	Mammal

Additional Endangered Species located within Yavapai County, Arizona

Common Name	Scientific Name	Species
Chiricahua Leopard Frog	<i>Rana chiricahuensis</i>	Amphibian
California Condor	<i>Gymnogyps californianus</i>	Bird
Colorado Pikeminnow	<i>Ptychocheilus lucius</i>	Fish
Gila Chub	<i>Gila intermedia</i>	Fish
Headwater Chub	<i>Gila nigra</i>	Fish
Spikedace	<i>Meda fulgida</i>	Fish
Black-Footed Ferret	<i>Mustela nigripes</i>	Mammal
Northern Mexican Gartersnake	<i>Thamnophis eques megalops</i>	Reptile

AMPHIBIANS

Chiricahua Leopard Frog (*Rana chiricahuensis*) has been found in Arizona and New Mexico. Its range is further east of the master plan area, in Yavapai County, but is included as it inhabits ponds, streams, rivers, livestock tanks, and other aquatic sites. Chiricahua Leopard Frogs need permanent water for reproduction, but that’s increasingly hard to come by: Southwest riparian areas are often destroyed by livestock grazing, groundwater pumping, water diversion, and dams. It is unlikely this species will be found within the master plan area.

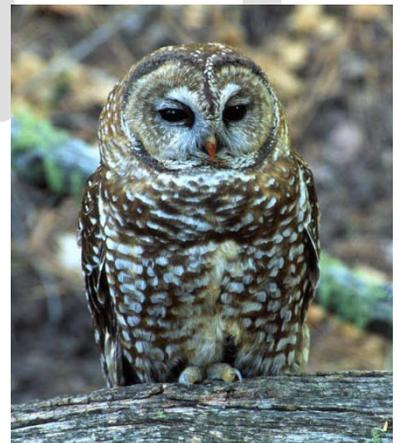


BIRDS

California Least Tern (*Sterna antillarum browni*) is an endangered species whose primary habitat is California. However, according to the US Fish and Wildlife Service, the California Least Tern is also known to occur in Maricopa County, Arizona. While unlikely to occur in the master plan area, it is included in this survey. Long, narrow wings and a broad, forked tail, a black-capped head and black-tipped, pale gray wings in contrast with its white body identify the California Least Tern. It bears a white blaze across its forehead, dark forewings, black-tipped yellow bill, and yellowish feet.



Mexican Spotted Owls (*Strix occidentalis lucida*) are residents of old-growth or mature forests that possess uneven aged stands, high canopy closure, multi-storied levels, with high tree density. Canyons with riparian forests provide habitat in the small mountain ranges (Sky Islands) distributed across the landscape. Unlike most owls, Mexican spotted owls have dark eyes. They are an ashy-chestnut brown color with white and brown spots on their abdomen, back and head. Their brown tails are marked with thin white bands. Populations in Arizona are patchily distributed and occur where appropriate habitat is present throughout all but the arid southwestern portion of the state. While it may be found in either Maricopa and Yavapai County, neither are listed as a critical habitat for the specie, for this reason it is unlikely that the species will occur in the master plan area, and if it does, most likely in the most northern limits.



Cactus Ferruginous Pygmy-owls (*Glaucidium brasilianum cactorum*) are a resident species that occur primarily in riparian cottonwood forests and mesquite bosques of central and southern Arizona. The Cactus Ferruginous Pygmy-owl was an endangered species in the U.S., but lost its status. There is currently a relisting petition by the Tucson based Center for Biological Diversity, but likelihood of relisting is not high.

Pygmy-owls also occur in Sonoran Desert scrub habitat where the vegetation is particularly dense and supports saguaros or mesquites of sufficient size to provide a nesting cavity; high density understory is also often present. Suitable areas also include xeroriparian habitats that consist of very dense desert scrub thickets bordering dry washes. Within the planning area, the xeroriparian habitat along the larger washes provides potential habitat for Cactus Ferruginous Pygmy-owls as does some of the upland habitat where saguaros and trees occur at moderate density.



The Pygmy-owl is reddish-brown, or sometimes grayish, with a cream-colored belly streaked with reddish-brown. They are active mostly at dawn and dusk. The tail is long for an owl and reddish-brown in color with dark bars. The pygmy-owl is nonmigratory throughout its range. Its diet includes other birds, lizards, insects, and small mammals.



The Pygmy-owl can be found in Sonoran riparian deciduous woodland and Sonoran desert scrub within the Arizona Upland Subdivision, from 1,000 to 4,000 feet in elevation. In central and southern Arizona the Pygmy-owl's primary habitats are riparian Cottonwood forests, mesquite bosques, and Sonoran desert scrub, but currently occurs primarily in Sonoran desert scrub associations of Palo Verde, Bursage, Ironwood, Velvet Mesquite, Acacia, and giant cacti such as Saguaro, and Organ Pipe. The master plan area contains several major wash corridors and smaller washes that contain xeroriparian habitat along the edges of these systems that contain suitable habitat for the Pygmy-owl.

Western Burrowing Owls (*Athene cunicularia hypugaea*) are protected under the Migratory Bird Treaty Act as amended in 1989. It has been determined that the western burrowing owl occurs throughout Arizona, with extreme northeast populations thought to be migratory and the remaining populations as residents. The burrowing owls typically enlarge the burrows made by reptiles and mammals, and are associated with rodent populations, which serve as important prey. Nesting has been documented in culverts. Burrowing owls typically colonize open areas. Desert habitats in southern Arizona utilized by the burrowing owl include open creosote-saltbush-bursage associations and grassland habitats that often have been grazed or are adjacent to agricultural fields. This owl is commonly found in and on irrigation canal banks, such as those in southern Arizona's agricultural areas. The master plan area contains



both appropriate food and nesting habitat to support the western burrowing owl, and owls are known to occur in the project area.

Southwestern Willow Flycatchers (*Empidonax traillii extimus*) are migrant summer breeders. The Southwestern Willow Flycatcher prefers dense, mature cottonwood-willow forests and tamarix (*Tamarix* spp.) thickets near slow-moving watercourses for breeding (low elevations). In general, habitat contains a large volume of foliage, dense canopy cover, and surface water during mid-summer. The Goodding Willow association along the live water in Morgan City Wash provides potential habitat for Southwestern Willow Flycatchers but the area has not been surveyed for this species. This species prefers large patches of habitat at least 33 feet in diameter. The nest is a small woven cup made out of shredded bark in the upright fork of a narrow tree limb or shrub usually 13 to 23 feet above the ground. The Southwestern willow flycatcher was listed by the USFWS as endangered in 1995. The first recovery action listed in the recovery plan is to increase and improve occupied, suitable, and potential breeding habitat. No Southwestern Willow Flycatchers have been verified during recent ADMP surveys at other sites in the Agua Fria River drainage including the nearby Waddell Dam.



Yellow-Billed Cuckoos (*Coccyzus americanus*) prefer habitat in riparian areas within California and along the Colorado River. The species has been known to breed in scattered locations where suitable habitat is available, including Maricopa County, Arizona. They are migratory birds that almost always nest in willows or cottonwoods for foraging. In the western, Yellow-billed Cuckoos have undergone catastrophic declines. Direct loss and degradation of low-elevation riparian woodland habitats have been cited as the primary causes for the decline. Factors contributing to habitat loss and degradation include alteration of flow schemes in rivers and streams; diversion of water for agricultural and municipal purposes; urban expansion; livestock grazing, which affects understory vegetation and cottonwood/willow recruitment; and pesticide applications which decrease local food supplies and potentially induce toxic accumulations in cuckoos. Because of the typical range and habitat type, it is unlikely this species will be found within the master plan area.



Yuma Clapper Rails (*Rallus longirostris yumanensis*) are an extremely secretive species, mostly restricted to relatively large marshes in extensive stands of emergent vegetation such as cattail and bulrush (*Scirpus* sp.). Smaller populations may occur in backwaters and smaller stands of emergent



vegetation. Historically, Yuma Clapper Rails have been found along the Salt River upstream to the confluence of the Verde and Salt Rivers. Yuma Clapper Rails do not typically occur within the master plan area because the riparian habitat along Morgan City Wash provides insufficient and unsuitable habitat.

California Condors (*Gymnogyps californianus*) are a New World vulture and are among the largest flying birds in the world. Adults are black except for prominent white underwing linings and edges of the upper secondary coverts. The head and neck are mostly naked, and the bare skin is gray, grading into various shades of yellow, red, and orange. California condors are opportunistic scavengers, feeding only on the carcasses of dead animals, including deer and cattle. After eating, condors bathe in rock pools and will spend many hours preening and drying their feathers. While the range for this species is listed as including Yavapai County, it is unlikely the bird will be found within the master plan area.



The **Bald Eagle** (*Haliaeetus leucocephalus*) was removed from the threatened and endangered species list on August 8, 2007. However, the bald eagle will receive protection under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Bald Eagles (*Haliaeetus leucocephalus*) occur as uncommon winter transients along rivers and lakes in southern Arizona. Bald Eagles nest along the Agua Fria River upstream of Lake Pleasant in most years. Disturbance to these nesting Bald Eagles is minimized by closing nesting areas between December 15 and June 15. Bald eagles forage in areas downstream of the dam, especially in the pond below the dam. Consequently, Bald Eagles use the riparian vegetation along the Agua Fria River and Morgan City Wash to a limited extent for foraging habitat. Habitat use patterns of Bald Eagles should be considered relative to future development plans even though the species was recently delisted by the U.S. Fish and Wildlife Service.



BATS

California leaf-nosed bat (*Macrotis californicus*) has large ears, a nose-leaf and distinctive guano odor. This species is mostly found in the Sonoran desert scrub and primarily roost in mine shafts, rock shelters, or caves and prefer to do so in large groups. They are sensitive to human activity. This species is known to abandon roost due to increased noise and activity. This bat is not known to hibernate, and although it may not



occupy the same roost year-round it is not known to migrate. They feed on large, flying insects such as grasshoppers, moths, and flying beetles. Insect larvae, especially lepidopterans, and other flightless, or daytime active prey are taken from bushes and off the ground. This bat may also feed on fruits, including those of cacti.

Cave Myotis (*Myotis velifer*) bats have a large hind leg, long forearm and robust teeth. This bat has a well-developed sagittal crest on the skull and is a dull gray to black color. It is the only *Myotis* with a bare patch on its back between the shoulder blades. The Cave Myotis roosts in caves, tunnels, mineshafts, under bridges, and occasionally in buildings near water. Preferred habitat for roosting includes desert scrub and, occasionally, pine-oak communities. The cave Myotis are opportunistic feeders, feeding on small moths, weevils, antlions, and small beetles.



Lesser Long-nosed Bats (*Leptonycteris curasoae yerbabuena*) are a summer resident that feed primarily on nectar from saguaros and agaves. The Lesser Long-nosed Bat is yellowish-brown or gray with cinnamon brown below. The snout of this bat is elongated with a nose-leaf that has an erected triangular flap of skin at the tip. Lesser Long-nosed Bats are found in desert grassland and shrub land up to oak transition. The species does not hibernate and roosts in areas like caves, mines, tunnels, and old buildings. The California leaf-nosed bat primarily feeds on night-flying beetles, grasshoppers, moths, and sometimes fruits, including those of cacti. The master plan area is within the northern range limit of Lesser Long-nosed Bats, and a sufficient number of saguaros exist in the planning area to support feeding by Lesser Long-nosed Bats. These individuals would represent a marginal population or individuals flying from distant roosts to forage in the area. Occupied caves and mines should be protected, and openings should be secured with suitable fencing to allow bats ingress and egress while providing public safety.



Pocketed Free-tailed Bats (*Nyctinomops femorosaccus*) are small to medium sized bats with deep vertical grooves along its upper lip with a length of 2 to 2.6 inches. They have long narrow wings with a wingspread of 13 to 14 inches and a tail that protrudes free from the interfemoral membrane. They have been found in Pima, Gila, Mohave, Maricopa, La Paz, Pinal, Graham, Cochise, and Yuma counties, which constitute the extreme northern edge of its range. This bat has been found in a variety of plant associations including desert scrub and pine-oak forests in arid lower elevations, usually around high cliffs and rugged rock outcrops. The pocketed free-tailed bat roosts in rock crevices during the day and may also use human-built structures. The bats are very noisy during day, which may draw



attention to their hiding place.

Western Yellow Bat (*Lasiurus xanthinus*) is a medium-large sized bat with a wingspan of 13.4-14.2 inches and a weight of 0.32 - 0.8 ounces. Their fur is yellowish-buff/light brownish tipped with gray or white. The western yellow bat is sexually dimorphic in size; females are larger. The western yellow bat ecology is not clearly understood and may be associated with Washington fan palm trees, other palms, or other leafy vegetation such as sycamores, hackberries, and cottonwoods which provide roost sites. Individuals have been found roosting about 15 feet above the ground in hackberry (*Celtis reticulata*) and sycamores (*Platanus wrightii*).



REPTILES

Sonoran Desert Tortoise (*Gopherus agassizii*). The Sonoran population of desert tortoise is usually associated with rolling, often rocky terrain in foothills and desert mountain ranges where the relief provides more naturally occurring shelter sites than in flatter terrain. This species also constructs burrows in the sides of incised washes. Desert tortoises are herbivorous and eat annuals, grasses, herbaceous perennials, shrubs, vines, and succulents. The desert tortoise ranges in length from 6–10 inches. Its color varies from light to dark brown. Its shell is composed of large plates containing concentric growth rings, with a new ring added for each year of growth. The legs and head of the tortoise are covered with scales. The shell and tough scales provide a natural armament against desert predators. In addition, the tortoise’s coloration, shape, and rocklike appearance are a natural camouflage.



There are indirect and interdependent effects on Sonoran tortoise that are associated with the increase of humans in the area, from project build-out and the associated stresses on the environment. Examples include agricultural land uses, residential construction, and recreational facilities such as parks and trails. Indirect effects also include predation by animals that often benefit from the presence of humans, such as ravens, coyotes, and dogs. Furthermore, humans historically have removed tortoises from the wild and adopted them as pets, and roadway fatalities often occur during tortoise crossings of busy streets and because tortoises seek shade under parked vehicles. The loss of both upland and bottomland desert scrub habitats associated with agricultural and residential land uses has likely imposed a direct effect on Sonoran desert tortoise habitat. To minimize these impacts, the Arizona Game and Fish Department has issues guidelines for handling Sonoran Desert Tortoises (see http://www.azgfd.gov/pdfs/w_c/turtle/2007%20Tortoise%20Handling%20Guidelines.pdf)

Lowland Leopard Frogs (*Rana yavapaiensis*) are most frequently associated with permanent and semi-permanent streams and springs in intermontane valleys and the foothills of the desert mountains of central and southern Arizona, south into central Sonora, Mexico. In southern Arizona, the species frequents stock ponds, developed springs, and other impoundments. Usually restricted to these situations for most of the year, during the summer rainy season, dispersing individuals can be found along seasonal streams and, under optimal conditions, moving over land in search of new habitat. At lower elevations, breeding may occur in mid-May and early July, though it may decrease during high temperature



months and increase once the summer rains start. The primary threats to this species are introduced predaceous fishes and bullfrogs. Information received from the Heritage data base at the Arizona Game and Fish Department documents occurrence of lowland leopard frogs in Morgan City Wash near its confluence with the Agua Fria River. There are stock ponds throughout the master plan area that could support Lowland Leopard Frogs and during recent ADMP field surveys, the species have been identified in the Upper New River ADMP area north of the study area and were observed in areas of live water within Morgan City Wash.

PLANTS

Arizona Agave (*Agave arizonica*) occur in the transition zone between oak-juniper and mountain mahogany-oak scrub. Known habitats are characterized by rocky slopes but the species also occurs on drainage bottoms or relatively gentle slopes or saddles. Arizona agave occurs in the New River Mountains of Maricopa County. However, it is questionable whether individuals of Arizona agave occur in or near the planning area. Additionally, Arizona agave is now considered to result from hybridization between *A. toumeyana* and *A. chrysantha*, and none of the area ADMP's report these parent species having been observed within the master plan area.



Hohokam Agave (*Agave murpheyi*) is native from central Arizona to Sonora, Mexico. Plants are usually found in close proximity to major drainage systems on open, hilly slopes or alluvial terraces in desert scrub with pre-Columbian agricultural and settlement features, having been cultivated by the Hohokam. The Tohono O'odham (Papago) and ranchers in Sonora, Mexico continue to cultivate the plant.



Other threatened and endangered species that occur within Maricopa County, *but are not likely* to be found within the master plan area:

Arizona Cliffrose (*Purshia subintegra*); Endangered - the appropriate soils are lacking

Arizona Hedgehog Cactus (*Echinocereus triglochidiatus arizonicus*); Endangered - the planning area is below the normal elevation range

Desert Pupfish (*Cyprinodon macularius*); Endangered - Live water in project area does not provide suitable and sufficient habitat

Gila Topminnow (*Poeciliopsis occidentalis*); Endangered - Not a historical component of the Agua Fria River system

Razorback Sucker (*Xyrauchen texanus*); Endangered - Live water in project area does not provide suitable and sufficient habitat

Mexican Spotted Owl (*Strix occidentalis lucida*); Threatened - Below the elevational range and lack of conifer forest habitat

Sonoran Pronghorn (*Antilocapra Americana sonoriensis*); Endangered - Outside of geographic range (too far north)



Arizona Cliffrose



Arizona Hedgehog Cactus



Desert Pupfish



Gila Topminnow



Razorback Sucker



Mexican Spotted Owl



Sonoran Pronghorn

SPECIAL STATUS SPECIES

The U.S. Fish and Wildlife Service (USFWS) lists species as endangered, threatened, candidate, or proposed for listing, under the Endangered Species Act (ESA); all of these categories include organisms identified as special status species. Wildlife of special concern in Arizona and plants protected by the Arizona Native Plant Law also are considered special status species. Wildlife of special concern in Arizona that are listed by the Arizona Game and Fish Department (AGFD) have populations in the state that may be in jeopardy, have known or perceived threats, or have experienced severe population declines as described by AGFD's listing. Additionally, most desert plants fall into one of five groups specially protected from theft, vandalism, or unnecessary destruction under the Arizona Native Plant Law. Where a project involves State Trust land, protected species require salvaging in accordance with this law. Involvement of other public or private land requires notification to Arizona Department of Agriculture within a specified number of days to allow for salvaging efforts prior to removal of protected plant species.

Bureau of Land Management (BLM) sensitive species are considered species of concern, when a project includes land administered by BLM. Bureau of Land Management (BLM) sensitive species are those species considered to have shown population declines, and BLM policy is to provide these species with the same level of protection as is provided for candidate species of the Endangered Species Act. The purpose of the policy is to “ensure that actions authorized, funded, or carried out on land managed by the BLM do not contribute to the need for the species to become listed under the ESA.

Special Status Species known to occur in Maricopa County, Arizona.

American Bittern (*Botaurus lentiginosus*) is a wading bird of the heron family. It is large, chunky, and brown, with a 37- to 45-inch wingspan. The American Bittern is usually well hidden in bogs, marshes, and wet meadows. Usually solitary, it walks stealthily among cattails or bulrushes. If it senses that it has been seen, the American bittern becomes motionless, with its bill pointed upward to blend into the reeds. It is most active at dusk. More often heard than seen, this bittern has a call that resembles a congested pump. Like other members of the heron family, the American bittern feeds in marshes and shallow ponds, dining on amphibians, fish, insects, and reptiles. Though most of the study area does not contain suitable habitat for the species, the numerous stock tanks may serve as foraging areas.



American Peregrine Falcon (*Falco peregrinus anatum*) has a diverse distribution. Formerly widespread in North America, the species currently ranges through much of the Rocky Mountain west, throughout northern Canada and Alaska, south into central Mexico, and along the eastern and western coasts of the United States. The Arizona population represents migrants and resident breeders. The species ranges statewide into lower desert areas but prefers cliffs and steep terrain above 5,000 feet elevation, frequently near water in woodland habitats. It preys mainly on birds found in wetlands, riparian areas, meadows, parks, croplands, mountain valleys, and lakes within a 10- to 20-mile radius of a nest site. Prey items may include bats and other small mammals. Though a decline in Arizona’s peregrine population was never observed, the population began to increase in the mid-1980s. It is currently estimated that over 200 pairs breed in the state. As a result of the significant recovery of peregrine falcon populations over much of its range, it has been removed from the Endangered Species List.



Belted Kingfishers (*Ceryle alcyon*) have a huge bill, a large head with a shaggy crest, and distinctive coloring. The large head and bill contrast with tiny legs and a short tail, giving a top-heavy appearance to belted kingfishers. Belted kingfishers subsist mostly on fish. However, they occasionally consume other prey, including terrestrial prey such as small birds, mammals, lizards, and insects. They make steep dives head-first into the water. The nest site of a belted kingfisher is mostly a tunnel excavated near the top of a vertical bank. Nests may be several miles from fishing grounds. The species prefers sandy soil at the nest site but may use gravel pits and soil caught in the roots of fallen trees. The numerous stock tanks throughout the master plan area provide valuable foraging areas for belted kingfishers. These tanks contain high densities of small fish that provide foraging areas for kingfishers, wading birds, and shore birds.



Black-bellied Whistling Duck (*Dendrocygna autumnalis*) is a common but not often seen species. It is largely resident, apart from local movements, and usually nests in hollow trees. Its habitat is quiet freshwater lakes, cultivated land, or reservoirs with plentiful vegetation, where this duck feeds mainly at night on seeds and other plant food. It is highly gregarious, forming large flocks when not breeding. The belly is black, and the large white wing bar is visible in flight.



California Brown Pelican (*Pelecanus occidentalis californicus*) is a large dark gray-brown water bird with webbed feet, a pouch underneath its long bill, and a wingspan of 7 feet. Adults have a white head and neck, a brownish-black breast and belly, and silver-grayish upper parts. The Brown Pelican's typical habitat is coastal areas, with nesting occurring on islands. The species has been found occasionally along Arizona's lakes and rivers. Most Arizona sightings are along the Colorado River, and the Gila River valley (Maricopa, Pinal, Mojave and Gila counties). Since there is no suitable local habitat, the California Brown Pelican is not expected to be significant in the master plan area.



Common Black Hawk (*Buteogallus anthracinus*) is a medium to large-sized hawk with broad rounded wings, and a hooked beak. Adults are uniformly blackish except for the white 1-3 inch-wide median band on the short broad tail, which is the most distinctive identification mark for this species. The Black Hawk's range is from northern South America and Guyana, to Central America, throughout Mexico, to the southwestern United States, including Arizona, southwest New Mexico, western Texas, and southern Utah. Individuals occasionally overwinter in Arizona and New Mexico.



The Black hawk preys on amphibians, fishes, reptiles, although they may supplement their diet with small mammals and insects. The Black Hawk hunts primarily from perches, often near ground such as low branches, downed trees, exposed roots, and prominent rocks; also walks on sandbars and mud flats in search of crabs or stranded fish. This hawk is a riparian nester, dependent on mature, relatively undisturbed habitat supported by a permanent flowing stream. Groves of trees are preferred over single trees. Throughout its range, they generally inhabit coastal lowlands of mixed savannah, dunes, ponds, lagoons and grasslands with a source of water nearby. The greatest threat to this species is the alteration and elimination of riparian habitat through clearing, water diversion, diking and damming, and lowering of the water table by underground pumping. At least 95% of the riparian habitat in the southwestern United States have been lost, altered, or degraded. They are vulnerable to disturbance and contamination of riparian prey species. Since suitable local habitat is limited, the Common Black Hawk is not expected to be significant in the master plan area.

Great Egret (*Ardea alba*) is a member of the heron family and has also been called the American or common egret. Its food includes small fish, mice, insects, lizards, and frogs. Egrets generally stalk their prey in the shallow margins of ponds, lakes, marshes, and canals. The great egret is often seen alone, but its social life includes gathering into large colonies. Roosts are made in trees and bushes in swamps and other watery habitats.



The nest of these birds is a large, somewhat loose assembly of sticks lined with twigs, vines, and similar materials. Aside from socializing with its own kind, the great egret can be found in the company of other members of the heron family, including the snowy egret. It will commonly be

found roosting in the same areas with these birds. Though most of the study area does not contain suitable habitat for the species, the numerous stock tanks may serve as foraging areas.

Ferruginous Hawk (*Buteo regalis*) is a medium-sized inhabitant of dry, open country. From September through April, wintering individuals can regularly be seen in any portion of Arizona with open environments. They can be seen perching in trees, on poles, or on the ground. The nest of the ferruginous hawk is a large structure of coarse sticks, built in rock piles, cliffs, on the ground, or in trees. The species feed on jackrabbits, cottontails, rodents, reptiles, and large insects. Creosote flats, agricultural fields, and open desert areas provide foraging areas for ferruginous hawks. Loss of these foraging areas may have an impact on the local populations of this species. A Ferruginous Hawks nest was recently observed west of the Agua Fria and south of SR74.



Gray hawk (*Asturina nitida*). Adults have blue-gray to slate-gray back and head, very finely barred gray and white breast and black tail with two to three bold, white bands. On both young and adults, eye color is dark brownish to black, and feet and cere are deep yellow in healthy birds. Color pattern distinctive, seldom confused with another species. Range is from southern Arizona, southern New Mexico and southern Texas south through Central America into South America east of the Andes south to northern Argentina and Paraguay. Locally, individuals have been seen along Verde River, Yavapai County and Maricopa County. Primarily lizards, especially of the *Sceloporus* genus; some small mammals. Prefers riparian woodlands with large trees (cottonwoods), usually near mesquite forests. Because suitable local habitat is outside the normal range for this species, the Grey Hawk is not expected to be significant in the master plan area.



Northern Goshawk (*Accipiter gentilis*) is considered to be the largest Gohawk in Arizona, females are larger than males. Adult wingspan is approximately 38 to 46 inches. Short wings and a long tail aid the goshawk in maneuvering through dense woods. Conspicuous light eyebrow, flaring behind eye, separates black crown from variably gray back and yellow feet. Breeds in high, forested mountains and plateaus statewide (usually above 6,000 ft). Species have been observed in Yavapai County. Dominant mammalian prey includes tree squirrels, rock squirrels, and cottontails. Band-tailed Pigeons, Mourning Doves, Stellar's Jays, and Northern Flickers are the principal avian prey in Arizona. The Goshawk nests in a wide variety of forest types including deciduous, coniferous and mixed forests, most commonly in ponderosa pine forests along the Mogollon Rim and on the Kaibab Plateau, and in Arizona pine and ponderosa pine forests in the southeastern mountains.



Occasionally, they breed in relatively low elevation oak forests in the southeastern portion of the state. Because suitable local habitat is outside the normal range for this species, the Northern Goshawk is not expected to be significant in the master plan area.

Osprey (*Pandion haliaetus*) breed primarily in White Mountains, and along Mogollon Rim. Rarely in summer on Mogollon Plateau, and along Colorado River and upper Salt and Verde River. May occur almost anywhere in migration. Winters sparingly along Colorado River, occasionally in Salt and Gila Valleys, formerly at Roosevelt Lake. In southeastern Arizona, uncommon spring and fall transient, usually seen at ponds or reservoirs. In Arizona, no desert nest sites have yet been documented. Nests consist of sticks lined with some soft material such as bark or moss and usually are located in an open area offering the birds clear access when landing. These are very rare birds in Arizona, where fish are scarce. Because suitable local habitat is outside the normal range for this species, the Osprey is not expected to be significant in the master plan area.



Snowy Egret (*Egretta thula*) is a typical member of the heron family. Snowy egrets are marshland birds and in Maricopa County, are encountered as often as Arizona's other common diurnal herons. Cattle egrets are common in meadows and pastures, and great blue herons and great egrets are common along rivers and streams. In Arizona, they occur year-round along the lower Gila River from Phoenix to the Colorado River. Arizona breeding colonies exist near Yuma, below Painted Rock Dam, and along the lower Salt and Gila rivers. The snowy egret is one of the more actively foraging herons. Species-preferred foods include fish, reptiles, amphibians, and aquatic insects. Though most of the study area does not contain suitable habitat for the species, the numerous stock tanks may serve as foraging areas.



Snowy Plover (*Charadrius alexandrinus*) A small sandpiper-like shorebird with light gray-brown upperparts, a dark patch on either side of the breast, and a white forehead with white extending along side of head directly over eyes like eyebrows. Breeding sites are limited to several man made and alkali ponds near Willcox in Cochise County and the ephemeral Painted Rock Reservoir in Maricopa County, though it migrates throughout the state. Avid walkers and runners, the species uses this locomotion technique in feeding, courtship, agonistic interactions, nest exchange, retreat from nest when approached and most activities associated with care of young. These birds can swim



short distance across ponds and slow-flowing water. Visual feeders, consuming insects, small crustaceans, and other minute invertebrates picked from surface of ground using a run-stop-peck technique. Will pick prey off low growing plants. Inland populations feed at salt pans, spoil sites and along the edges of salt ponds, salt marshes, and lagoons. Inland feeding is usually done in very shallow water or over wet mud or sand. Some foraging also occurs on dry flats and playas. Because suitable local habitat is outside the normal range for this species, the Snowy Plover is not expected to be significant in the master plan area.

Tropical Kingbird (*Tyrannus melancholicus*) Large flycatcher with a relatively large bill and long, slightly notched tail. They have a concealed reddish-orange crown-patch and the back and rump is grayish olive. The wings are dull brown or blackish, coverts edged gray. Found more commonly in southern Arizona. Catches flying insects in the air; also picks insects off low vegetation or on ground. Frequently eats berries, plucked while perched or in flight. Prefers areas with scattered trees, savanna, open woodland, forest edge, plantations, residential areas and agricultural lands. Occurs in lowlands near water in Arizona, often nests in cottonwoods. May be found near water, often nesting in native riparian corridors, but suitable local habitat is outside the normal range for this species, therefore the Tropical Kingbird is not expected to be significant in the master plan area.



Western Least Bitterns (*Ixobrychus exilis*) roosts, nests, and hides in dense, emergent vegetation and in adjacent thickets of Salt Cedar in desert riparian habitat. The emergent vegetation may be interspersed with clumps of woody vegetation and open water. It uses dense, emergent vegetation for cover and nesting, and feeds in such vegetation, as well as in small openings. Its nesting habitat is usually near open water or a small opening in vegetation. It often feeds along the edge of emergent vegetation on the open-water side. The least bittern eats small fishes, aquatic and terrestrial insects, amphibians, small mammals, and miscellaneous invertebrates. Though most of the study area does not contain suitable habitat for the species, the numerous stock tanks may serve as foraging areas. Protection of these areas as foraging sites should be considered.



Crested Saguaro (*Carnegiea gigantea*). Crested or fan-top saguaros are rare. Less than 1 percent of saguaros exhibit the condition, and the cause is still a subject of debate. Some researchers cite the causative factors as freezing, developmental problems, or mechanical injury to the saguaro's apical meristem. No crested saguaros were located in the study area during the surveys. If any are located during the course of future development, they should be avoided or salvaged carefully.



SPECIAL STATUS SPECIES CONCLUSIONS AND RECOMMENDATIONS

Though most of the study area does not contain suitable habitat for wading and shore birds, areas adjacent to the numerous stock tanks serve as foraging areas. Occupied caves and mines should be protected, and openings should be secured with suitable fencing to allow bats ingress and egress while providing public safety.

Though no mines or caves are identified in this document, a more complete survey of rock outcropping areas should be conducted to determine whether mines or caves are present and whether they are being used.

Desert tortoise surveys of suitable habitat in the study area should be conducted prior to disturbance.

Local raptor populations, such as the red-tailed hawk and the Harris' hawk, may be negatively impacted by the future loss of foraging areas, mature xeroriparian habitat, and saguaros, which serve as observation points.

The larger, more densely vegetated washes should be preserved not only for their habitat values but for the connectivity they provide throughout the project area. Morgan City Wash, the Agua Fria River and the New River have a higher density and diversity of vegetation and often larger individuals of a particular plant species than adjacent upland areas. This higher density and diversity provide more resources for wildlife. Resources for wildlife commonly include cover, food, nesting substrates, denning areas, and movement corridors. The enhanced cover along these washes provides opportunities for movement by larger mammals, such as mule deer, javelina, and coyote, and habitat for smaller mammals, passerine birds, and reptiles.

This specialized function should be considered and provided for in any proposed improvement or development that occurs or may occur in these sensitive areas.

SPECIAL STATUS SITES IN THE PLANNING AREA

Morgan City Wash is a sensitive and biologically unique habitat within the master plan area. It is an aquatic area with an accompanying riparian gallery forest. This habitat extends from the confluence with the Agua Fria River upstream to above the source of the water. The riparian gallery forest is well developed and mature throughout this area, while the stream supports numerous species of wetland plants and aquatic species including native fish such as Longfin Dace (*Agosia chrysogaster*) and Lowland Leopard Frogs.



It is recommended that this area be further surveyed prior to development in order to document additional sensitive species in the area. It is also recommended that a plan be developed prior to any potential development that will minimize human impacts to this habitat corridor so as to preserve its biological integrity.

Proposed buffer zones for lower Morgan City Wash and adjacent areas were designed in conjunction with the Arizona Game and Fish Department, Mesa, Arizona. The preferred buffer zone provides enhanced protection to biological integrity, and consists of an approximately 2000 foot corridor on each side of Morgan City Wash and along the Agua Fria River. This boundary roughly corresponds to the top of the second nearest ridge from which there will be moderately lower levels of indirect drainage into Morgan City Wash. This buffer zone will largely preserve existing habitat features, drainage patterns, and erosion controls, with effects to adjacent sensitive habitats being low to negligible. Moreover, this corridor provides maximal protection to riparian vegetation and associated wildlife. This corridor also provides a preserve that is large enough to minimize the effects of habitat fragmentation on most riparian species, and also to many desert/upland habitat species. The corridor should extend at least 0.5 miles upstream of the source of live water.

MIGRATORY BIRD TREATY ACT

In accordance with the Migratory Bird Treaty Act (MBTA), it is unlawful to pursue, hunt, take, capture or kill; attempt to capture or kill; possess, offer to or sell, barter, purchase any migratory bird, part, nest, egg or product covered under the act. Violation of the MBTA is subject to criminal and civil penalties. A majority of the bird species in Arizona are considered migratory and would be protected under the MBTA. The greatest potential to violate the MBTA within the study area is on potential flood control projects during the nesting season. If construction disturbance is planned during nesting season, a biologist should survey the area to flag vegetation with nests containing eggs or baby birds. These nests must be left undisturbed until the young birds fledge.

BIODIVERSITY AND ECOSYSTEM FUNCTION: Why protection and preservation is important



The world is now undergoing a new wave of extinctions. To preserve species, engineers, landscape architects, biologists, ecologists, and other scientists must work together to preserve or recreate wildlife habitat. This involves complex decisions such as sizing and spacing of habitat patches and ecosystems. Wildlife intrusion into urban and suburban areas is a result of sprawl and the negative impacts of climate change. Wildlife are threatened most by climate change, roads and infrastructure, deforestation, fire, invasive species, exurban development, and hunting. Natural corridors must be preserved or created to connect isolated surviving habitat, thus enabling the scale they need. Wildlife uses the landscape differently than do people therefore, designing for wildlife involves thinking through the scales they require. Some species require more space while others can survive within a smaller space.

Successful wildlife preservation zones include a core habitat area, buffer zone, and transition zone where human settlements interface. Providing appropriate wildlife crossing corridors is critical. Animals need assurances that a corridor is going to be there after they have tested it and start using it. Overpasses are preferred by large animals rather than underpasses (elevation is very important to large species). Many animals become attracted to development - Coyotes for example often wander far from natural areas because water and food is more readily available in urban settings.

It is estimated that nature, in its most general sense, provides nearly \$38 trillion in services to humans per year. In order to fully understand the financial gain, we need to understand the value of trees, fungi, microbes, and other natural services and how they benefit or repair the harm development has placed on the natural resources. Collectively, these benefits are known as ecosystem services and include products like clean drinking water and processes such as the decomposition of wastes. These services were defined by the *United Nations 2004 Millennium Ecosystem Assessment*, a four-year study involving more than 1,300 scientists worldwide.

For further discussion of biodiversity and the economic benefit of ecosystem function, see **Appendix C: Ecosystem Value**