SWEETWATER PRESERVE

and the Sonoran Desert Conservation Plan

prepared by

Tucson Mountains Association
Sweetwater Preserve Committee

September 2001

DESERT TORTOISE - This charismatic reptile resides within the proposed Sweetwater Preserve. As urban sprawl continues to intensify in the Tucson Mountains, conservation areas have become increasingly vital to the long-term survival this population. Females require 10–20 years to reach sexual maturity and their reproduction is as uncertain as desert rain. Although protected by Arizona law, desert tortoises are especially vulnerable to habitat disturbance, illegal collecting, and disease. photo © Thomas Wiewandt

MULE DEER (cover photo) - The Tucson Mountain foothills, including Sweetwater Preserve, support a healthy population of mule deer. And thanks to the deer, mountain lions still visit the area. Unfortunately, bighorn sheep, present in the 1940s, have disappeared; but given enough protected land, their reintroduction might prove feasible. photo © Thomas Wiewandt

Prehistoric and contemporary designs used in this document are from Hohokam, Mimbres, and O'odham cultures in southern Arizona and New Mexico.

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Edited by: Thomas Wiewandt and Paula Chronister
Printed by: Arizona Lithographers and West Press on recycled paper

Sponsors: Funded in part by contributions from the Trust for Public Lands, Tucson Mountains Association, Lohse Foundation, the David Morton Trust, and Arizona Lithographers.

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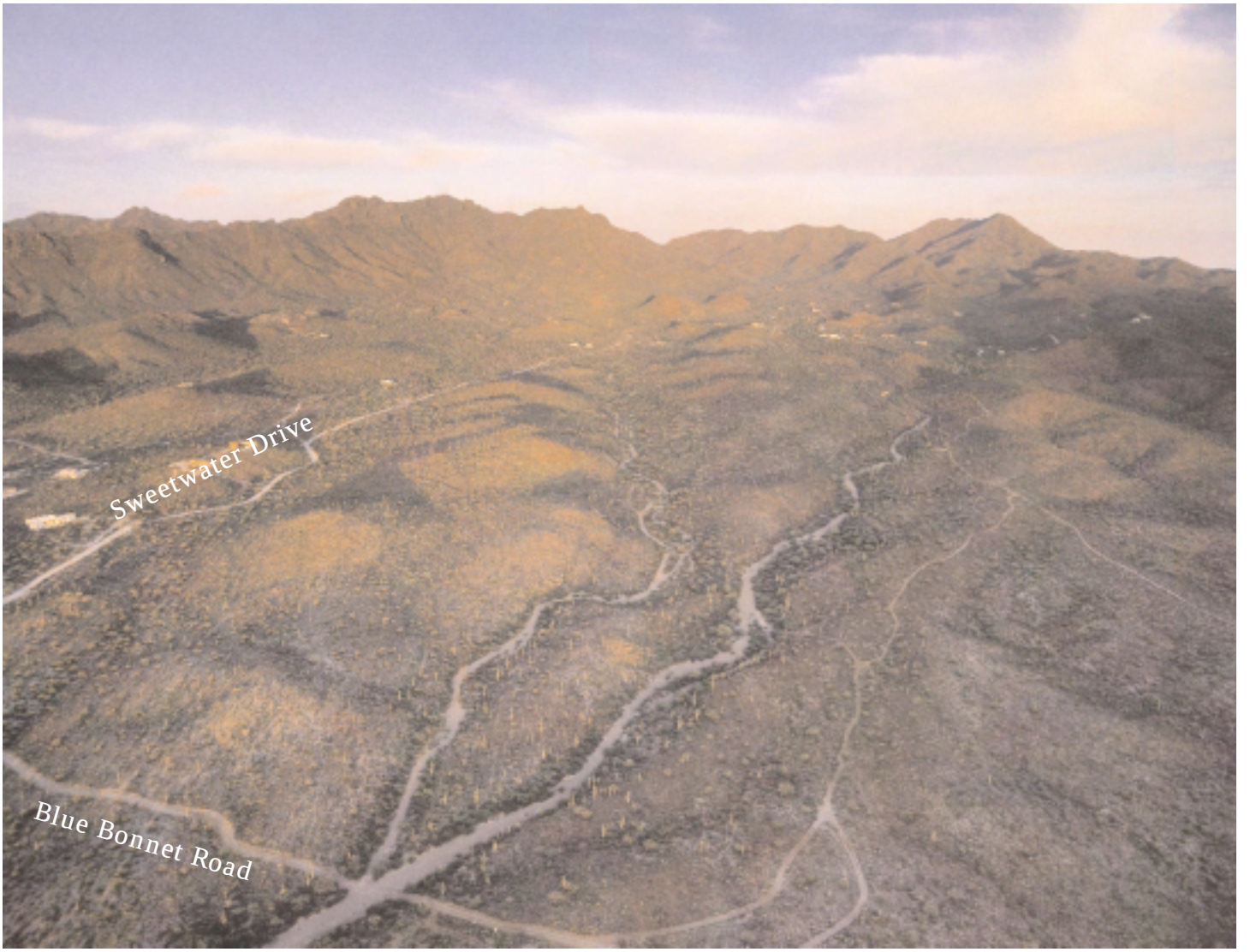

Aerial view southwest across the southern two-thirds of Section 26, the heart of Sweetwater Preserve. Two major tributaries of Sweetwater Wash converge at Blue Bonnet Road; and hiking/equestrian trails can be clearly seen north (to the right) of these natural watercourses. Private lands situated along Sweetwater Drive in the corridor between the preserve and existing Sonoran Desert conservation areas (Saguaro National Park West, Tucson Mountain Park, and the University of Arizona's biological research preserve) are either undeveloped or sparsely populated with single-family homes. We propose to create, by fee acquisition, Sweetwater Preserve, to help achieve the goals of the Sonoran Desert Conservation Plan. At 880 + acres, this is the largest undeveloped parcel left in the Tucson Mountains.
photo © Adriel Heisey

SWEETWATER PRESERVE
and the Sonoran Desert Conservation Plan

OUR GOAL: *Acquisition of Sweetwater Preserve by a public agency for conservation and open space purposes to help achieve the goals of the Sonoran Desert Conservation Plan*

The proposed Sweetwater Preserve, at approximately 880 acres, is the largest remaining tract of undeveloped land in the Tucson Mountains of southern Arizona. The land is now owned by Sweetwater Properties, an investment consortium. Within a half mile of the proposed preserve are a national park and a biological research preserve, both contiguous with a a major county park. Private lands situated between Sweetwater Preserve and these Sonoran Desert conservation areas are either undeveloped or sparsely populated with single-family homes (see folded map).

The diverse geology of the Tucson Mountains gives the area a unique character. Its varied topography and complex mix of rock and soil types have resulted in a wide but unevenly distributed array of plants and animals. The Tucson Mountains contain the fourth-highest botanical diversity in the state of Arizona. More than 40 mammal species, at least 110 species of birds, 45 species of reptiles and amphibians, and more than 1,000 species of native bees live in this area.

This remarkable diversity of the Tucson Mountains provides both an opportunity and a challenge for conservation. After consulting with county, state, and federal officials, as well as non-governmental organizations, we believe that acquisition is the best strategy for preserving this biological diversity. We propose to create, by fee acquisition, the Sweetwater Preserve, to help achieve the goals of the Sonoran Desert Conservation Plan.

ORIGIN AND INTENT OF THE SONORAN DESERT CONSERVATION PLAN

In 1998, Pima County undertook an historic task. With the support of then-Interior Secretary Bruce Babbitt, county officials began the largest single Habitat Conservation Plan in history. Habitat Conservation Plans provide a mechanism to balance development with the needs of imperiled species. Currently there are more than 300 conservation plans covering 20 million acres of public and private land in the United States.

Pima County occupies an enormous swath of Sonoran Desert, acknowledged by many biologists to be one of the most remarkable and biologically diverse habitats in the world. Human population in the Sonoran Desert has more than doubled over the past 20 years, and the Sonoran Desert Conservation Plan is intended to balance the needs of people and wildlife. The final draft of the plan is expected to be complete in the fall of 2002.

IMMINENT THREAT

Arizona is the second-fastest growing state in the United States. Tucson's population is growing at the rate of approximately two percent a year. It is estimated that the Tucson area is losing one-half acre an hour to sprawl. The Tucson Mountains region has the county's second-highest growth rate.

In the last five years, 23 new subdivisions have been built in the Tucson Mountains. Five of these are located within two miles of Saguaro National Park West (see photograph, p. 32). Real estate developers have shown aggressive interest in the land proposed for Sweetwater Preserve, and the current owners appear eager to sell it to any willing buyer.

A variety of land conservation strategies will be needed to make the Sonoran Desert Conservation Plan a reality. Because of its size, biological

richness, proximity to major parks, and its riparian corridors with watershed connections to the Santa Cruz River, we believe acquisition of the proposed Sweetwater Preserve is crucial to the success of the Sonoran Desert Conservation Plan.

SWEETWATER PRESERVE: KEY POINTS

Size and Diversity

- The proposed Sweetwater Preserve is the largest remaining piece of undeveloped land in the Tucson Mountains (approximately 880 acres).
- The Tucson Mountains region contains the fourth-highest diversity of flora in the state of Arizona.
- Twenty-nine percent of the botanical diversity in the Tucson Mountains falls outside the boundaries of Saguaro National Park West. Protecting large contiguous lands is critical for habitat and species preservation.
- The saguaro cactus, our regional icon, densely populates Sweetwater Preserve, and young plants are abundant. During the early summer dry season, when food and water are often critically scarce, the saguaro provides the desert's only source of moist fruit.
- With its 1,000 to 1,200 species of native bees, the Tucson Mountain region is regarded by experts as the richest known parcel of bee real estate in the world.

Proximity to Other Conservation Areas

- The preserve is located within a half mile of current conservation areas and would be an attractive addition to the park system. Only one property owner holds the 40-acre link between the preserve and Saguaro National Park; and other private lands between the proposed preserve and existing conservation areas are sparsely developed and serve as wildlife corridors (see aerial photograph, p. 4).
- Sweetwater Preserve would greatly expand options for scientific field research, especially significant to biologists working at the University of Arizona's Desert Station, which is only a half mile away.

Watershed and Riparian Habitat

- Pima County has identified critical riparian habitat along four washes that cross Sweetwater Preserve. The largest, Sweetwater Wash, connects Saguaro National Park West with the Santa Cruz River and is considered a major watershed for this mountain range.
- Sweetwater Wash is county-regulated riparian habitat with intermittent water supplies, classed Xeroriparian "A" habitat. Habitats ranked "A" in importance support the greatest plant and animal diversity within this category.

Vertebrate Species of Concern

- Although unconfirmed by U. S. Fish & Wildlife officials, a federally listed Endangered species, the cactus ferruginous pygmy owl, was located on Sweetwater Preserve last year by an environmental consulting firm.
- Another Endangered species, the lesser long-nosed bat, resides in the Tucson area during its summer breeding season. These bats fly for about six hours each night, covering distances within reach of all mountain ranges that rim the Tucson Basin. They feed on nectar and pollen of saguaro flowers, so cactus forests that densely populate portions of the Tucson Mountains—including Sweetwater Preserve—may prove to be important foraging areas.
- Two extremely vulnerable reptiles—the desert tortoise and Gila monster—are listed as Protected Native Wildlife by the Arizona Game & Fish Department. Both reside in Sweetwater Preserve. Because urban development has already destroyed much of their habitat in the Tucson Mountains, parks and preserves are vital to their long-term survival here. Petitions to federally protect all Sonoran Desert populations of the tortoise were active between 1984 and 1990, and efforts to assess the status of this species are on-going.
- Sweetwater Preserve is prime habitat for other wildlife species that deserve special recognition and protection, including the tiger rattlesnake, grey fox, bobcat, and mountain lion.

Cultural and Historic Resources

- Although the Preserve has not yet been formally surveyed, its location suggests that historic or even prehistoric archeological sites may be found.
- Sweetwater Preserve contains 52 check dams and other water control features constructed of native stone in the 1930s by the Civilian Conservation Corps. These erosion control elements slow the water flow—a great benefit to wildlife—and meet the federal 50-year requirement to be considered for historic site status.

Viewsheds

- Sweetwater Preserve contains two protected peaks and ridges and ten candidates for protection under Pima County's new hillside protection ordinance.

Trails

- Equestrian and hiking trails that serve the public are braided through the 880 acres of the proposed preserve. The 1989 Eastern Pima County Trail System Master Plan identified Sweetwater Wash as worthy of protection for recreational use.

COMMUNITY SUPPORT IS STRONG

Last year, volunteer botanists, zoologists, ecologists, hydrologists, and anthropologists published a report containing science-based recommendations to protect the natural resources of the Tucson Mountains as part of the Sonoran Desert Conservation Plan (see *The Next Frontier* report, presented to Pima County by the Tucson Mountains Committee, June 3, 2000).

One of the five key Citizens' Recommendations made in this report was a proposal to protect through acquisition the 880 acres we are calling the Sweetwater Preserve. This initiative was supported by virtually all major community and neighborhood groups in the area, including the Tucson Mountains Association—the oldest homeowners association in Arizona, now 360 members strong.

RECOMMENDATIONS

For the conservation of biologically critical areas in the Tucson Mountains, while preserving open space, scenic viewsheds, and enhanced recreational benefits to the community, the Sweetwater Preserve Committee recommends:

- Acquiring Sweetwater Preserve to protect this important property from development, while establishing stewardship for its long-term management by an appropriate public agency.
- Acquiring the 40-acre, privately owned parcel that links park lands with Sweetwater Preserve.
- Creating a system of inviolate buffers and habitat corridors around all protected parcels through conservation easements or other arrangements with owners of connecting properties.

What is happening in the Tucson Mountains is a clear example of a phenomenon that has become emblematic of the contemporary American West: the collision of urban sprawl with wilderness. Careful resource planning and land acquisition have been outpaced by development, so our options for the future are quickly vanishing before our eyes. The Sweetwater Preserve parcel is a natural treasure too valuable to lose. We urge you to act swiftly.

LEGAL DESCRIPTION OF PROPERTY

PROPOSED FOR SWEETWATER PRESERVE

Sweetwater Properties, is legally described, for the purposes of this report as:

Parcel 1: 181.94 acres located in the of the North 1/2 of the North 1/2 AND part of the N 1/2 of the S 1/2 of the NW 1/4 of Section 25 together with several easements that cross this property.

Parcel 2: An easement along the west side of the above described property, approximately 2.98 acres

Parcel 3: 615 acres which comprises all of Section 26, except a small portion in the SW corner

Parcel 4: 80 acres in the West 1/2 of the SW 1/4 of Section 23, all these parcels are adjacent and contiguous and are situated in the Township 13 South Range 12 East, Gila and Salt River Base and Meridian, Pima County, AZ. (Sweetwater Properties includes the 880.72 + /- acres currently owned by Sweetwater Properties and Camino De Oesta Properties title held by Jess Morgan, 5750 Wilshire Blvd. #590, Los Angeles 90036)

the big map inserts here

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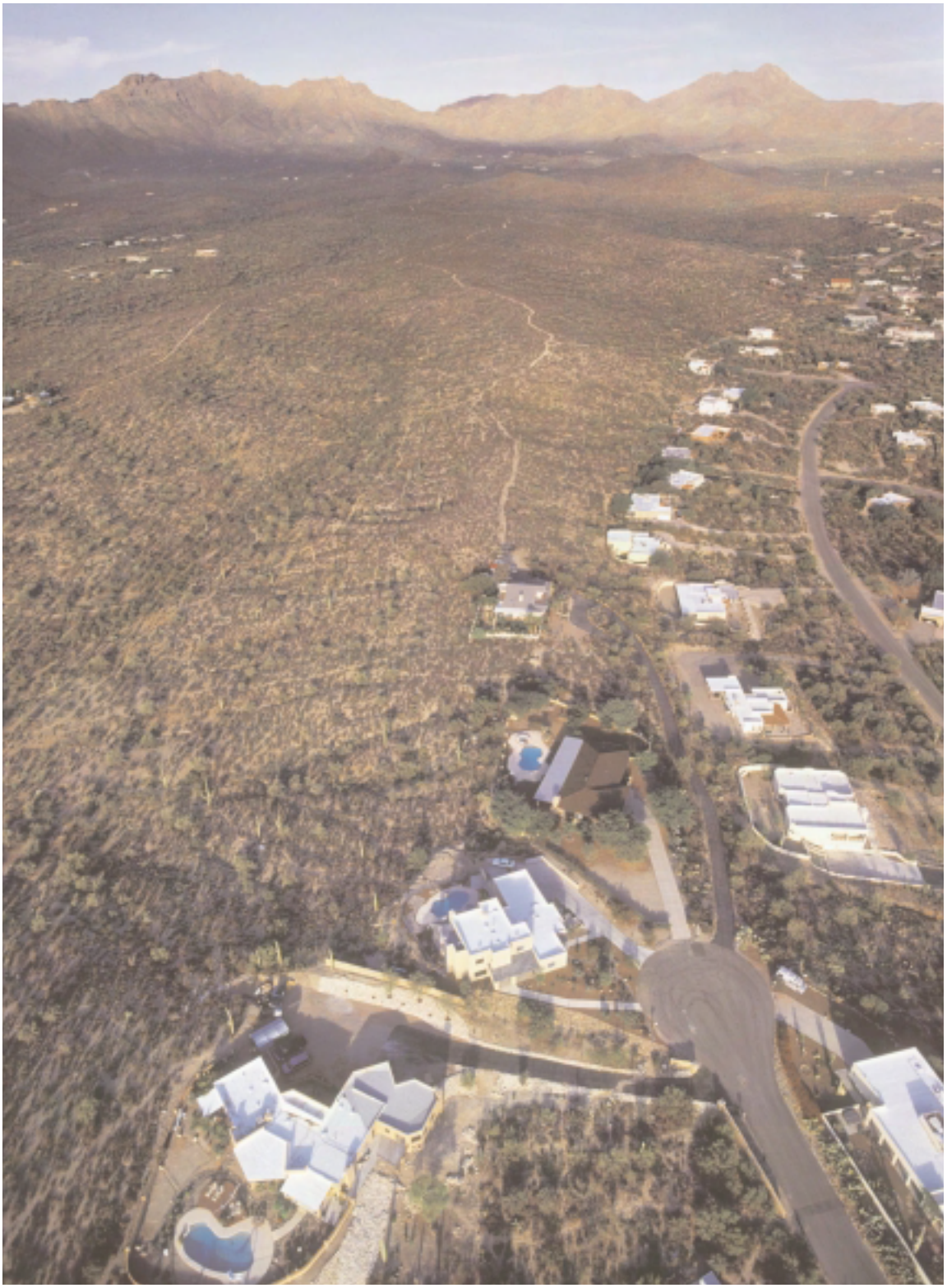


Aerial view of urban sprawl that radiates from Camino del Cerro along the northern boundary of Sweetwater Preserve. It is estimated that the Tucson area is losing one-half acre an hour to sprawl, and the Tucson Mountains region has the county's second-highest growth rate. In the last five years, 23 new subdivisions have been built in the Tucson Mountains, and real estate developers have shown aggressive interest in the land proposed for this preserve. To protect it, we must act now. photo © Adriel Heisey

GREY FOX - Few hikers or residents have seen one of these handsome animals in Tucson's desert foothills. They still populate the Sweetwater area however, where this one was captured on film; but if urban sprawl goes unchecked, increasing numbers of people, dogs, and coyotes will drive them away. Coyotes often thrive near housing developments in the foothills and, given the opportunity, will kill a grey fox.
photo © Thomas Wiewandt

BIOLOGICAL DIVERSITY IN THE TUCSON MOUNTAINS

Roger Carpenter & Thomas Wiewandt

The Tucson Mountain Range creates a scenic western edge to the city of Tucson, a major natural and recreational resource for Tucsonans and visitors. The 20-mile-long mountain range contains the fourth-highest diversity of local flora in the state of Arizona and the largest amount of undeveloped land in the Middle Santa Cruz watershed planning area. It is also the most populated of the five planning areas designated under the Sonoran Desert Conservation Plan.

The Tucson Mountains support a rich diversity of of birds, five amphibian species, 40 reptilian species, and over 40 mammalian species. These mountains, their foothills, and their bajada slopes also sustain an astonishing 1,000-1,200 species of native bees—regarded by experts as the richest known parcel of bee real estate in the world.

Largely because of the complex geological history of the Tucson Mountains (see Gungle in *The Next Frontier* report, 2000), most resident plants and animals have localized and patchy distributions related to specific soil type, terrain, and topography. Data from the boundary resource inventory for Saguaro National Park in 1993 indicate that Sweetwater Preserve "is in the midst of the geological formation known as 'Tucson Chaos,' a jumble of igneous and sedimentary rock which only recently has been recognized as the remains of the lid of a collapsed volcanic caldera. The resulting diversity of local parent rock has given rise to a patchwork of distinct soil lenses and these varied soils in turn influence the distribution of the flora and fauna." This point is well illustrated by the fact that 29% of the flora in the Tucson Mountains has not been found in Saguaro National Park West, an area of more than 24,000 acres.

PLANTS

> *The Tucson Mountains support a surprising botanical richness. . . . No other desert range of similar size has such a large flora. One reason for the great richness is its topographical diversity ranging from the Santa Cruz River through valley floors and bajadas, rocky slopes, deep canyons, and a summit that is just above the desert in relict oak-grassland vegetation. The equal summer and winter rainy seasons contribute further to the number of plants; numerous species respond mainly to one or the other season. Lastly, because of its position on the wet eastern edge of the Sonoran Desert there are numerous elements coming in from the grasslands to the east.*
>
> *Saguaro National Park gives added value to the area. It is the only national park that is split in half by, and—for the Tucson Mountains section—is nearly surrounded by urban development. The long-term preservation of the natural character of this mountain range and its parks depends on careful management of the mountain range itself as well as preserving corridors to adjacent natural areas that permit free migration of plants and animals between them.*
>
> —Mark Dimmitt

The immediate impression of the Tucson Mountains landscape is that of rugged, often steep terrain covered with low scrubby vegetation. At first glance, this appears to be a homogeneous habitat, dominated by saguaro, prickly pear, and cholla cacti; ocotillo, jojoba, and bursage; and small mesquite, palo verde, and ironwood trees. Following wet winters, about three dozen species of blooming annual plants are easily recognized.

It will thus astonish non-botanists that a recent systematic survey of plants in the Tucson Mountains (Rondeau et al., 1996) listed 633 taxa (610 species, plus 23 subspecies and recognizable

hybrid populations) from 80 families. These plants are by no means evenly distributed throughout the region, but are found to varying degrees in one or more of seven plant species associations: Creosote Bush, Creosote-Bursage, Palo Verde-Saguaro, Jojoba Mixed Scrub, Desert Grassland, Desert Riparian Scrub, and Palo Verde-Saguaro-Ironwood. They are distributed according to physical variables such as soil type and elevation. Saguaro National Park West includes all of these plant associations. Yet the National Park can protect only 452 of the total 633 plant taxa (71%) listed in this report.

The Tucson Mountains region contains the fourth-highest diversity of flora in the state of Arizona. Twenty-nine percent of the botanical diversity in the Tucson Mountains falls outside the boundaries of Saguaro National Park West. Protecting large contiguous lands is critical for habitat and species preservation.

Rondeau et al. considered only two species to be rare and endangered. The Parish Indian mallow was found in only six locations within the study area. Pringle's lipfern is abundant in Mexico, but reaches the northern limit of its distribution in this area. However, despite the thoroughness of their 4-year survey and work by others, they were unable to locate 25 species that had been collected in the region prior to 1950. There are also other species present here that are rarely seen anywhere else, e.g. the shrubs *Hermannia pauciflora* (Hierba de Soldado), *Mimosa distachya* (Gatuño), *Zapoteca formosa*, and a new herb discovered in the Rondeau study, *Amaranthus tucsonensis* (Tucson Amaranth). One species, the night-blooming cereus (*Peniocereus greggii*), benefits from its "safeguarded" listing by the State of Arizona.

These botanists argue that maintaining species richness is best done by protecting large areas. Up to 50% of all plant taxa in the region are at risk because their distributions are so restricted that construction of a road or residential development may simply eliminate such localized populations. Protecting small parcels may fail to include the significant habitat of local or rare species. It is also noteworthy that habitat fragmentation may put some species beyond reach of their pollinators (Spira, 2001; Rathcke & Jules, 1993).

BEES

In their book *Forgotten Pollinators,* Stephen L. Buchmann and Gary Paul Nabhan (1996) write: "Compared to other deserts around the world, the Sonoran Desert surrounding Tucson and extending into Mexico is exceedingly rich in native plants.... The Desert Museum's flora, including that of the adjacent Tucson Mountains ... may harbor almost 1,000 species of native bees.... That would make it the richest known parcel of bee real estate in the world."

Buchmann has now revised his estimate of bee species in the region to between 1,000 and 1,200. Among them are species crucial for pollination of endemic plants, including bees in the genus *Centris*; the Sonoran bumblebee genus *Bombus,* species *sonorous*; and the Halictid family, especially the genus *Dialictus*.

VERTEBRATE ANIMALS

As is the case with plant and insect species, the vertebrate fauna is impressive for a region that appears to be so inhospitable. We are not aware of any recent systematic surveys of vertebrate animals in the Tucson Mountains. But it is certain that there are five species of amphibians, 40 species of reptiles, 110 species of birds, and approximately 40 species of mammals. Particularly noteworthy in areas contiguous with Sweetwater Preserve are sightings of desert tortoises, Gila monsters, tiger rattlesnakes, grey fox, bobcats, and mountain lions. And two federally listed Endangered species probably utilize the Sweetwater Preserve parcel: the cactus ferruginous pygmy owl and the lesser long-nosed bat.

Amphibians & Reptiles

Reptilian species of the Tucson Mountains include one tortoise, 18 lizards, and 21 snakes (see Checklist A). Among the most distinguished are the desert tortoise, Gila monster, and tiger

NATIVE BEES - The Tucson Mountains, their foothills, and bajada slopes sustain an astonishing 1,000-1,200 species of native bees—regarded by experts as the richest known parcel of bee real estate in the world. Digger bees (Family Anthophoridae, Tribe Eucerini, top) and cactus bees (*Idiomellisoides*, bottom) are among them. Fragmented habitats prevent some insects from reaching the plants they pollinate. The smaller insect in the top photograph is probably a sweat bee (Steve Buchmann, personal communication). photos © Thomas Wiewandt

GILA MONSTER (above) - This distinguished resident of the Sweetwater area is our largest, most fabled, and only venomous lizard in the U.S. Few people have had the good fortune to see one in the wild. These secretive reptiles have large home ranges that span up to a mile or more and are readily displaced by urban sprawl—most often, they turn up in swimming pools.
photo © Thomas Wiewandt

DESERT SPADEFOOT TOAD (above right) - Awakened by vibrations from pounding raindrops during violent summer storms, spadefoot toads emerge to breed at temporary puddles in arroyos. Life in the water—from egg to tadpole to toadlet—can be completed in less than two weeks. And by eating only one big meal of termites, adults can outwait fickle rains and make it through another year of sleep underground. photo © Thomas Wiewandt

TIGER RATTLESNAKE (above) - Once relatively common in Tucson Mountain Park near Gates Pass, this attractive and non-aggressive reptile-of-concern is rare there today. It's unprotected, prized by snake collectors, and like all reptiles, suffers heavy mortality on paved roads. Paved roads trap heat, so heat-seeking pedestrians—reptiles and amphibians—often linger on these warm surfaces. Tiger rattlesnakes are still seen regularly adjacent to Sweetwater Preserve and undoubtedly occur there as well.
photo © Thomas Wiewandt

rattlesnake. Although none of these reptiles is federally listed as Threatened or Endangered in Arizona, our state law designates the desert tortoise and Gila monster as "Protected Native Wildlife," which means that these species of special concern may not be killed or collected without a permit.

The desert tortoise is listed as Threatened in the Mojave Desert, owing to disease, destruction of habitat, and capture for pets. Petitions to federally protect all Sonoran Desert populations of the tortoise were active between 1984 and 1990, and efforts to assess the status of this species are ongoing. While Arizona populations appear stable, information currently available is insufficient to draw secure conclusions about their future, especially with increasing threats from urban growth and habitat fragmentation (Arizona Interagency Desert Tortoise Team, 2000).

According to the Arizona Interagency Desert Tortoise Team (2000), "most of the central and south-southeastern portion of the tortoise's range (Maricopa, Pinal, and Pima counties) occurs on relatively unprotected Arizona State and forest service lands. . . . Important gaps in desert tortoise habitat protection occur near the metropolitan areas of Phoenix, Tucson, and to some extent Kingman, as well as intervening lands between these areas." Moreover, "With the recent development of much of this bajada habitat in the Tucson Mountains, habitat remaining in the park [Saguaro National Park West] is increasingly important for the long-term viability of this local population."

Desert tortoises are active within the Sweetwater Preserve (Brent Martin, unpublished data, 2001). Surprising for a shelled animal with short legs, in the Sonoran Desert this species prefers rocky terrain, characteristic of foothills and bajada slopes of the Tucson Mountains.

Like the desert tortoise, Gila monsters reside in the Tucson Mountains adjacent to and most certainly within Sweetwater Preserve. Residents along the western leg of Sweetwater Drive are occasionally rewarded with a glimpse of these fascinating creatures. Because of their secretive ways, Gila monsters are extremely difficult to study, but through radio-tracking, herpetologist Daniel Beck and his colleagues have determined that these lumbering lizards have large home ranges, spanning up to a mile or more. They are not yet listed as Threatened; but with increasing urban development, they are often displaced from their natural habitat and turn up in swimming pools. Being America's largest, most fabled, and only poisonous lizard, this remarkable animal deserves special attention.

> *Today, the Gila monster is celebrated for what he is: a unique, native Southwesterner whose infrequent appearances bestow a special blessing to the land and brighten any day afield. The animal's venomous nature is considered fascinating rather than sinister, and his bizarre reputation is regarded more as charming regional folklore than the product of Gothic nightmares. As one of the most brilliantly colored, yet least seen and understood inhabitants of the Sonoran Desert, the lizard has come to symbolize the desert's beauty and mystery. Let us hope the Gila monster will remain a source of such inspiration and be with us always.*
>
> —from Brown & Carmony, 1991
> *Gila Monster: Facts and Folklore of America's Aztec Lizard*

Another noteworthy native of the Tucson Mountains is the tiger rattlesnake, *Crotalus tigris*. Arizona is our only state with known populations of this attractive, non-aggressive, and little-studied species; and its distribution is spotty and strictly limited to rocky hillsides, canyons, and bajadas of south-central portions of the state and northern Sonora, Mexico. The Tucson Mountains is considered one of the tiger rattlesnake's strongholds, but it has all but vanished from parts of its former range. Within Tucson Mountain Park, tiger rattlesnakes were frequently sighted 30 years ago in the Gates Pass area; but today such a find would be a rarity (Wiewandt, personal observations). Farther north in the Tucson Mountains, however—adjacent to Sweetwater Preserve—tiger rattlesnakes are still seen with regularity. Recently, in June 2001, resident Terry Moore found a large pregnant female; later, in August, he observed a mating pair near his Sweetwater home (Wiewandt, personal communication).

Birds

Birds noted in Checklist B on pages 38 and 39 have been seen in the desert foothills and riparian scrub habitats near Camino de Oeste Wash and West Speedway (approximately 2 miles from Sweetwater Preserve—see Checklist B). The list of 110 species includes migrants and seasonal or year-round residents.

The only avian species in the Tucson Mountains known to be Endangered is the cactus ferruginous pygmy owl; a firm hired by the property owners has conducted the only owl surveys on Sweetwater Preserve to date. On May 25, 2000, Thomas Olsen & Associates, the permit-holding consultants, reported hearing two-note and chitter calls within Section 26 in response to playback of tape-recorded calls of this pygmy owl. The owls were not seen however; and a follow-up visit to the site by officials from the U.S. Fish & Wildlife Service failed to confirm this report (Mike Wrigley, personal communication). Elsewhere in the Tucson Mountains, the pygmy owl has been sighted at "Rancho de Las Lomas" in 1989, 1991, 1992, near the intersection of West Speedway and Camino de Oeste. Though highly mobile, pygmy owls prefer to feed and nest in mixed plant communities of saguaro, palo verde, and ironwood. Section 26 of Sweetwater Preserve is dominated by dense stands of saguaro and palo verde.

Particularly noteworthy in areas contiguous with Sweetwater Preserve are sightings of desert tortoises, Gila monsters, tiger rattlesnakes, grey fox, bobcats, and mountain lions. And two federally listed Endangered species probably utilize the Sweetwater Preserve parcel: the cactus ferruginous pygmy owl and the lesser long-nosed bat

Mammals

Checklist C includes 42 mammal species known, or nearly certain, to reside in the Tucson Mountains. The larger animals, such as deer, javelinas, and the carnivores generally have large home ranges, and they may be seen anywhere within this region. Unfortunately, Interstate 10 is currently a major barrier to movement of large mammals between the Tucson and Tortolita mountain ranges. Bighorn sheep were present in the Tucson Mountains in the 1940s, but are now absent. Species of small mammals such as rodents are more likely to have broken distributions, for many are closely tied to specific foods, soil types, or other essential resources. Even bats, whose high mobility gives them foraging ranges over square miles, are concentrated at preferred roosting sites during the day.

Grey fox, mountain lion, and bobcat sightings are especially noteworthy. The grey fox is extremely wary and sensitive to human encroachment. In Sweetwater Canyon between Desert Station and the Sweetwater Preserve parcel, Wiewandt (personal observations) has seen and photographed grey fox; other residents have also spotted them in this area and farther west. These locations are rocky, relatively remote, and without dogs. Coyote populations in these areas also seem low, lower than we have experienced in urbanized desert foothills around Tucson. Given the chance, a coyote will kill a grey fox.

Mountain lions require huge home ranges and are occasionally seen in the Tucson Mountains. Since 1990, scientists at Desert Station have, on several occasions, sighted mountain lions in the area. One memorable peak of activity occurred during the winter and spring of 1995. Robert Smith observed a pair of them drinking from his water tank on Desert Station; two adolescents—probably the same individuals—spent four days in the shelter of neighbor's house that was under construction at the time (Joe Comella, personal communication); and early one morning just west of Sweetwater Preserve, Craig Morton came face-to-face with one. In the same year, there were several reports of fresh, partially eaten deer kills in the canyon. Bobcat sightings are much more frequent in this same area; they are usually seen drinking from swimming pools and water holes that Sweetwater residents have provided for wildlife.

There seems to be so little known about the biology of some of the small mammals that population estimates for many rodents and for shrews are only speculative. Among those known to be at risk, however, are bat populations, which frequently

suffer depredation at their roosts by vandals and appear to warrant special protection from human disturbance.

At least 11 species of bats are known to frequent the Tucson Mountains (see Checklist C). Two are at risk: the mastiff bat (*Eumops perotis*), which requires crevices on high cliffs for roost sites; and the California leaf-nosed bat (*Macrotus californicus*), which is widely distributed in the Southwest, though at low population densities. This latter species merits attention because of its requirement for high temperature roosts during the winter months (Bell et al., 1986). Land containing mine tunnels or other suitable roost sites for bats is particularly worthy of protection. Moreover, most mines or prospect holes, whether on public or private land should be gated by approved, "bat-friendly" methods to protect roosting bats from vandals and to eliminate the owners' liability for maintaining an "attractive nuisance."

New roads and "leap frog" development break up formerly continuous populations into a number of small, disjunct ones, a practice that can have catastrophic effects on both flora and fauna. The long-term impact is to reduce the genetic diversity within each small area, so that each of the smaller populations becomes less likely to survive, and to open the way for invasion by alien species.

Another, the Endangered lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*), is a federally listed migratory species that lives in southern Arizona from late spring through summer. During this period—which includes the flowering season of the saguaro cactus—females give birth and raise their young before returning to Mexico. The species depends upon and is an important pollinator of agaves and columnar cacti, including the saguaro. Of the sparse data available for the Tucson area, lesser long-nosed bats have been thus far recorded only from the Santa Catalina and Rincon Mountains (Hoffmeister, 1986; Cockrum and Petryszyn, 1991; Yar Petryszyn and Russell Duncan, personal communication). Tracking data indicate that these bats fly for about six hours each night. They fly in looping patterns as they feed, covering distances of 50 to 62 miles (T. Fleming, unpubl. data from USFWS, 1995). Such flights take them up to 30 miles from their daytime roosts, within reach of all mountain ranges that rim the Tucson Basin (David Dalton, personal communication). Studies in May—when saguaros bloom—are needed to accurately assess the distribution of this species and the importance of food resources in the Tucson Mountains to their welfare.

BIOLOGICAL CONSEQUENCES OF URBAN SPRAWL

Surveys indicate that all species in the Tucson Mountains are unevenly distributed, with some requiring large tracts of land while others fill localized niches. Preserving only small areas would fail to provide enough land for daily and seasonal activity patterns of many animals and would fragment populations, leading to genetic impoverishment and eventual extinction. Simply put, the smaller the "island," the less likely its flora and fauna will survive—this is a well established principle in biogeography.

Urban expansion near our desert parks not only creates barriers to wildlife, it opens the way for invasion by exotic plants and puts our parks at serious risk from fire. Alien plants, such as African buffelgrass, fountain grass, and Russian thistle (tumbleweed), spread quickly along roads and lines of development, and their presence introduces brush fires into the desert. Unlike many forest and grassland ecosystems, fire kills native Sonoran Desert plants easily, especially saguaro cacti and palo verde trees, which dominate the Tucson Mountains. Burning eventually converts desert scrub to desert grassland—habitat that is more prone to subsequent fires. And desert tortoises are among the victims. Fire kills and injures tortoises and may keep them from finding suitable shelter, preferred foods, and incubation sites (Van Devender, in press).

Roads that accompany urban sprawl also have a far greater long-term impact on desert wildlife than most people suspect. Construction and traffic noise can alter animal activity and reproductive patterns; and the outright slaughter of animals on roads is astonishing. A four-year census of road kills in Saguaro National Park headed by NPS wildlife biologist Natasha Kline revealed

that on the 45 miles of roads surveyed, upwards of 22,000 vertebrates are killed annually, not including injured animals that drag themselves off the roadway or those taken by scavengers. Of those corpses found, 66% were reptiles and amphibians, 6% birds, and 28% mammals. Given, too, that posted speed limits are lower within the park than outside it, and that many of the park roads are closed to vehicles at night, this tally represents a highly conservative total of approximately 500 vertebrate animals killed per mile of road per year. Reptiles have the highest mortality because paved roads trap heat, and these heat-seeking pedestrians often linger on warm surfaces. The impact on populations of the longer-lived species—Gila monster, desert tortoise, and bobcat, for example—can be especially severe because these species reach reproductive maturity slowly and may not breed successfully every year. Losing just one desert tortoise per year in a dwindling population could be catastrophic (Dollar, 2001).

Dense stands of the saguaro cactus populate Sweetwater Preserve, and young plants are numerous....During the early summer dry season, when food and water are often critically scarce, the saguaro provides the desert's only source of moist fruit; and the multitude of animals that feed on it are as diverse as wasps, bats, javelinas, and woodpeckers.

SUMMARY OF LIVING RESOURCES

The Tucson Mountains are geologically complex and contain a rich diversity of 610 + species of plants, at least 110 species of birds, five amphibian species, 40 reptilian species, and over 40 mammalian species. Within each of these groups a large number are known to have, or can be expected to have, small regional distributions. With the exception of birds and some of the large mammals, it is unlikely that any of these species occurs evenly over the range. This point is emphasized by the fact that 29% of the flora in the Tucson Mountains has not been found in Saguaro National Park West, an area of 24,000 + acres.

Dense stands of the saguaro cactus populate Sweetwater Preserve, and young plants are numerous. This is a keystone species in the Sonoran Desert because so many animals depend upon it for food and/or shelter. During the early summer dry season, when food and water are often critically scarce, the saguaro provides the desert's only source of moist fruit; and the multitude of animals that feed on it are as diverse as wasps, bats, javelinas, and woodpeckers.

Several rare plants occur in the Tucson Mountains; and Rondeau et al. (1996) reported that 25 plant species collected prior to 1950 were not found in their recent survey, suggesting that some species may be slipping away unnoticed. A detailed survey of plants on Sweetwater Preserve is needed.

With its 1,000 to 1,200 species of native bees, the Tucson Mountain region is regarded by experts as the richest known parcel of bee real estate in the world.

Of the vertebrate animals, the cactus ferruginous pygmy owl and the lesser long-nosed bat are the only species now officially listed as Endangered. Though classed as an unconfirmed sighting by the U. S. Fish & Wildlife Service, an environmental consultanting firm located pygmy owls there on May 25, 2000. The lesser long-nosed bat resides in the Tucson area during its summer breeding season. These bats fly for about six hours each night, covering distances within reach of all mountain ranges that rim the Tucson Basin. They feed on nectar and pollen of saguaro flowers, so cactus forests that densely populate portions of the Tucson Mountains—including Sweetwater Preserve—may prove to be important foraging areas.

The desert tortoise and Gila monster are listed by the Arizona Game & Fish Department as Protected Native Wildlife, supported by an on-going program of research and status review (the tortoise is already federally listed as Threatened in the Mojave Desert). Both species are extremely vulnerable to impacts from urban sprawl, and conservation lands are critically important to their long-term survival near metropolitan areas.

We feel that in the Tucson Mountains special care must also be taken with the tiger rattlesnake, grey

MOUNTAIN LION - Many of us who live in Tucson dream of the day when we can capture an image like this one in the wild. Symbol of the Arizona-Sonora Desert Museum and photographed there, this magnificent cat still roams our desert mountain ranges. It's comforting to know that in recent years, mountain lions have been observed on several occasions in the Sweetwater area.
photo © Thomas Wiewandt

A low aerial view of a typical riparian area within Sweetwater Preserve. Pima County has identified critical riparian habitat along four washes that cross Sweetwater Preserve. The largest, Sweetwater Wash, connects Saguaro National Park West with the Santa Cruz River and is considered a major watershed for the Tucson Mountains. Riparian habitats are vital to the welfare of most desert wildlife. photo © Adriel Heisey

fox, bobcat, mountain lion, and at least two other bat species. Bighorn sheep, present in the 1940s, have disappeared; and because so little is known about most other wildlife populations in the Tucson Mountains, it is difficult to say with certainty that others are not now at risk.

New roads and "leap frog" development break up formerly contiguous populations into a number of small, disjunct ones, a practice that can have catastrophic effects on both flora and fauna. The long-term impact is to reduce the genetic diversity within each small area, so that each of the smaller populations becomes less likely to survive, and to open the way for invasion by alien species. Alien plants, especially introduced grasses, increase the risk of fire; and fire is known to have devastating effects on plants and animals native to the Sonoran Desert. All responsible agencies must take steps to ensure that both the obvious and less obvious species are protected from habitat fragmentation and degradation. Even if Sweetwater Preserve were sold to a developer rallying for low-density development, the network of new roadways alone would have a huge impact on the ecology of the area.

Given the trend towards highly uneven distributions of plants and animals in the Tucson Mountains, protecting small isolated parcels of land will contribute little to the long-term welfare of a significant number of species. Wise conservation strategies require the acquisition and protection of large, contiguous tracts of land. Special consideration should be given to those of varied topography, especially if they include washes. Sweetwater Preserve is one such tract. Washes serve as wildlife corridors, can retain water for amphibians, and contain denser riparian vegetation, providing habitat for a far greater number of species.

Given the trend towards highly uneven distributions of plants and animals in the Tucson Mountains, protecting small isolated parcels of land will contribute little to the long-term welfare of a significant number of species. Wise conservation strategies require the acquisition and protection of large, contiguous tracts of land.

For all of these reasons, we feel that the 880-acre Sweetwater Preserve represents our last great opportunity to acquire and protect a parcel of land that would contribute substantially to the long-term welfare of flora and fauna native to the Tucson Mountains.

WATERSHED/DESERT WASHES

Compiled by Emily R. Johnston

Currently Pima County has identified critical riparian habitat along four of the washes within Sweetwater Preserve. The word *riparian* originates from a Latin word meaning. Here in the semi-arid western United States, it means along a watercourse, arroyo, seep, pond, or other location where the availability of water is increased. The community of the watercourse, its vegetation, and its wildlife are collectively referred to as a riparian area. Riparian vegetation is the vegetation that grows along streams, dry washes, seep ponds and other places where the availability of water is higher than in the upland areas. The term used herein can include standing or flowing water.

Riparian areas have been called “streams of life” and “lifeblood” of the desert. Approximately 60 to 75% of Arizona’s resident wildlife species are dependent on riparian habitats to sustain their populations, yet these riparian areas occupy less than 1% of the state’s total land (ARC, 1994). Riparian areas are among the most productive ecosystems in the world and they may be the highest, rivaling our best agricultural lands, in the production of biomass (ARC, 1994).

In addition to these four riparian habitat areas, the Sweetwater Wash also serves as a major watershed connecting the Tucson Mountains and Saguaro National Park West to the Santa Cruz River (see folded map). It has also been identified as worthy of protection in the 1989 Eastern Pima County Trail System Master Plan.

HISTORY AND PURPOSE OF WATERCOURSE AND RIPARIAN HABITAT PROTECTION IN PIMA COUNTY

Article X of the “Pima County Floodplain and Erosion Hazard Management Ordinance” entitled, “Watercourse and Riparian Habitat Protection and Mitigation Requirements” was amended and adopted by the Pima County Board of Supervisors on July 14, 1998. Article X was adopted for the purpose of enhancing wildlife values by preserving riparian vegetation along watercourses and floodplains.

Also adopted with the ordinance were maps indicating the location of existing riparian habitats meeting certain criteria. The ordinance affords protection to these mapped habitat areas and requires certain actions when sites containing such vegetation are developed or subdivided.

SWEETWATER PRESERVE DESIGNATION

There are three Types of Regulated Habitats in Pima County. Sweetwater Preserve falls within the category of “Xeroriparian A” Habitat. Category “A” habitat has the most dense vegetation within the Xeroriparian subcategory. It is categorized by a TVV greater than 0.850 Cubic Meters per Square Meter (M3/M2).

Xeroriparian habitats are associated with intermittent water supplies (ephemeral streams) and may include plant species from upland areas. Although the plant species present are similar to those found upland, their densities are greater due to the relative abundance of water. Typical species include palo verde and mesquite, along with occasional Mesoriparian species. “Habitat” is not the same as vegetation. It refers to all of the things in its environment that an organism needs to survive. So, riparian areas can include the barren sand bars where lizards run, the little holes along the banks where swallows nest, or

the pools of water where toads breed after the summer rains. The vegetation density of category "A" creates greater diversity in both plant and animal species.

WATERCOURSE FUNCTIONS AND PROCESSES

Sweetwater Wash serves as a major watercourse for the Tucson Mountains connecting Saguaro National Park West with the Santa Cruz River. Watercourses serve as passageways for water to travel downhill. They are also the areas where most natural storage and recharge of groundwater occurs. The beds of watercourses tend to be sandy in the valley and the underlying soils are usually capable of allowing water to permeate. In general, when the flows are relatively slow and broad, infiltration occurs most effectively. Water that infiltrates is slowly released in the form of perennial or intermittent flow, or stays in the aquifer. A representative from the Pima County Flood Plain Office estimates that Sweetwater Wash in Section 26 may flow at approximately 2000 cubic feet per second.

Riparian areas:

- Transport water and dissipate energy during flood events through the floodplain
- Make shallow groundwater available to vegetation
- Flush accumulated salts down below root zones
- Store sediment between floods
- Store and recharge groundwater
- Provide valuable wildlife habitats and corridors for movement
- Offer recreational opportunities (hiking, horseback riding, etc.)
- Improve water quality

Threats

In the last 100 years, most of Arizona's low-elevation riparian habitats have been altered or destroyed by human activities (ARC, 1994). Little more than a century ago, portions of the Santa Cruz River flowed year-round in Pima County (Hendrickson and Minckley, 1984). As shown and documented in Pima County's Water Resources reports and the Sonoran Desert Conservation Plan, many plant and animal species that use riparian areas, and more particularly, those in groundwater-dependent riparian zones, are threatened with extinction or regional elimination (see Harris Environmental Group report, May 2000).

It is almost always more expensive to restore a damaged area than to prevent damage. If basic conditions remain unchanged, a watercourse that has been minimally damaged (through erosion, for example) can repair itself. It is only when additional strain such as land-clearing is placed on the watercourse that it has difficulty recovering. Too much stress (to the point of losing the water supply, for example) may render the area unrecoverable. Although as mentioned above, Pima County does have an ordinance to try and mitigate the damages done to washes and riparian habitat, these ordinances continue to allow high-density development within 50 to 100 feet of a wash. In a recent case of development within the Tucson Mountains (see photograph, p. 32) the desert was fully bladed and houses were developed on 50' to 100' lots destructively close to Roger Wash. Roger Wash is also a major riparian habitat and watershed area (see folded map).

According to the Saguaro National Boundary Inventory report, riparian corridors leading from the national and county parks are essential to the integrity of wildlife populations because animals frequently must travel along these corridors to reach water sources outside the protected areas. Generally in the desert, slope, aspect, soil, vegetation cover, and other factors influence the existence and distribution of most species. The proximity of low-density foothills residences, which essentially surround Saguaro National Park West, is another factor affecting the distribution of wildlife, especially in washes along the boundary.

Riparian habitat is the most endangered wildlife habitat in the state—less than 10% of the original riparian areas remain intact in Arizona today. Consequently, all four washes that cross Sweetwater Preserve deserve generous protection. They serve wildlife both in the preserve and in surrounding park lands.

PROTECTED PEAKS AND RIDGES (VIEWSHEDS)

Paula Chronister

The peaks, ridges, and slopes of the Sweetwater Preserve are also aesthetically significant. They are foothills of the Tucson Mountains and Wasson Peak and add to the area's natural beauty up-close and from afar. Furthermore, views within western portions of Sweetwater Preserve are especially scenic due to the combination of washes with dramatic hills and ridges that hide urban developments to the north. Along Sweetwater Drive, scattered residences have been built in the canyon, including several hilltop homes; but the natural beauty of the area prevails.

Currently there are two protected peaks and ridges on the Sweetwater Preserve. The Tucson Mountains Peaks and Ridges Committee has identified ten additional peaks and ridges as candidates for protection, to be voted on by the Pima County Board of Supervisors in the fall of 2001. In addition, stringent deed restrictions for development near protected peaks and ridges are being recommended to the County Board of Supervisors. Pima County regulations bar new development within 150 feet of any protected peak or ridge. These candidate peaks and ridges were chosen because their skylines and silhouettes dominate views over a large area.

TRAILS AND RECREATION

Sharon Welch

An extensive trail system exists in Sweetwater Preserve in T13S R12E, Sections 25, 26, 27, and 28. Many of these trails were created in the 1940s and '50s by ranches located on Sweetwater Drive. They began with the Sun Circle Ranch in the 1940s which later became the Saddle and Surrey Guest Ranch. The guest ranch operated from the 1950s to the 1980s, then becoming Cottonwood de Tucson, a residential treatment center which exists today at 4110 West Sweetwater Drive.

By the time the Saddle and Surrey closed its doors, increasing population in the area resulted in even more intense use of the trails by area equestrians, hikers, and mountain bikers. There are a number of long-time residents in the area who can attest to the continuous use of these trails. In fact aerial maps taken in late 1960s and 1990s show continuous use of trails in Sweetwater Preserve.

The Eastern Pima County Trail System Master Plan includes a number of trails in these Sections. Ordinance #1996-75 requires that trails listed on the Master Plan be provided through the development process. The Director of Pima County Parks and Recreation Department has the ability to request the provision of additional trails not listed on the Master Plan if appropriate. When the Master Plan is updated next year, the neighborhood will undoubtedly recommend that additional trails be added.

CULTURAL RESOURCES OF THE TUCSON MOUNTAINS AND THE MIDDLE SANTA CRUZ RIVER

Gayle Hartmann and Tom Vincent

According to the Arizona State Museum and Linda Mayro, the Pima County Archaeologist, Sweetwater Preserve has never had a formal archeological survey. Yet, as noted below, the preserve's location suggests that some historic or even prehistoric archeological sites may be found. From a human perspective, the Santa Cruz River has been, without question, the most important resource in Pima County.

The documented use of the Santa Cruz River corridor began several thousand years ago, making this corridor one of the longest continuously occupied zones of habitation in the United States, if not the longest. The time periods when early hunting and gathering peoples began to settle down, build houses, farm, dig irrigation canals, and make pottery have all been documented along the Santa Cruz River. These discoveries have come from deeply buried sites in the river floodplain, but early materials are also to be found on the surface of the ground both on the lower bajadas and in the mountains themselves.

Within the last two thousand years the Santa Cruz river corridor became the center of population in the Tucson Basin with Hohokam communities closely spaced along both sides of the river. Unfortunately, most of the prehistoric information from the east side of the river has been lost under the concrete and asphalt of developed Tucson and environs. The west side has fared somewhat better, but not at all well. Locations of pre-eminent importance where preservation is essential include the remains of large village sites at the north end of the Tucson Mountains (Huntington, Los Morteros), the Rabid Ruin in the Sweetwater Drive area, sites near the base of "A" Mountain, the Valencia site to the south, and the San Xavier/Martinez Hill/Punta de Agua area.

The mountains themselves contain significant resources from the Hohokam period. Resource gathering locales, consisting of low rock structures and stone tools, are not uncommon. Dry farming fields with water retention features of a variety of types occur in a few localities. And, perhaps most important, are the *trincheras* sites on basaltic hills. These may include rock walls and terraces, remains of structures, and constructed trails as well as a wide variety of artifacts.

Of historic importance within the Tucson Mountains are the route of the Quijotoa Toll Road (Starr Pass Trail), small mines, lime kilns, *arrastres* (milling locations), saguaro-harvesting locales, early homesteads, and water control features. In 1936, in conjunction with grazing, more than 100 check dams and related features were constructed of native stone by the Civilian Conservation Corps. Although many of these dams are now silted-in, they still slow the flow of storm run-off, a great benefit to wildlife. Fifty-two of these dams lie within Sweetwater Preserve and meet the federal 50-year requirement to be considered for historic site status.

Instead of merely mitigating the destruction of cultural resources in the river corridor and the mountains, as the law requires, our energies should shift to purchase wherever possible. Where purchase cannot occur, emphasis should be on low-density, low-impact development. What will be important in the long term will be the protection of what little of our past remains, combined with the protection of the outstanding natural resources of this region.

SWEETWATER PRESERVE'S RELATIONSHIP TO EXISTING PARK LANDS AND RESERVES

Paula Chronister

HISTORY OF SAGUARO NATIONAL PARK WEST EXPANSION

On November 15, 1961, Presidential Proclamation 3439 established Saguaro National Park West, the west unit of what was then Saguaro National Monument, to preserve the vegetation and wildlife of the Tucson Mountains, specifically the extensive stands of saguaro cactus (*Carnegiea gigantea*). On October 20, 1976, Public Law (PL) 94-567 designated a total of 71,400 acres as wilderness in the park; 13,470 of those acres were in Saguaro National Park West. The next day, on October 21, 1976, PL 94-578 expanded the district to 20,574 acres, which included rugged and undisturbed lands on the north and east boundaries and the gently sloping bajada on the west boundary.

In 1994, Congress recognized the great value of these lands by furnishing them with additional recognition and protection: Saguaro National Monument became Saguaro National Park.

At the same time, the Park boundary was adjusted, based on a comprehensive resource study. It is worth noting that this study found that a set of expansion districts could be justified by virtue of the surprising array of species found on such lands, making them worthy of federal protection and removing them from the pressures of the land development that was becoming more intense in the Tucson Mountains.

We have used this study, which remains the most definitive, as the basis for the following report. We have taken the liberty to update it when necessary.

The land ownership pattern surrounding Saguaro National Park West consists of private parcels of various size with and without substantial improvements and larger parcels administered by the Bureau of Land Management (BLM), Bureau of Reclamation, Arizona State Land Department (school trust lands), and Pima County.

National Park Service policy requires consideration of adjacent lands that may have important resources or implications related to park purposes. The rapid, sustained growth of the greater Tucson metropolitan area and recent residential development proposals have caused locally concerned citizens to exert pressure on the National Park Service and the Arizona congressional delegation to propose expansion of Saguaro National Park West.

A 1993 boundary resource inventory (Norris, 1993) was the first phase of a multi-phased boundary study for Saguaro National Park West. Providing information on resource qualities on adjacent lands is the first step in the total analysis of boundary conditions relative to adjacent land use. In the boundary resource inventory under Resource Area 3, approximately 400 acres of the Sweetwater Preserve was determined to share and contain resources of benefit to the national park. These values included:

1. Natural Resources

The preservation of biological diversity, which includes protecting stands of saguaro cacti and riparian vegetation, and protecting rare plant and animal populations, habitats, and wildlife corridors.

2. Cultural Resources

The preservation of prehistoric, historic, and ethnographic resources

3. Wilderness Values

The preservation of wilderness characteristics like solitude, open space, and the opportunity for primitive recreation and spiritual refreshment, as mandated by the 1976 wilderness designation.

4. Viewsheds & Scenic Vistas

The preservation of viewsheds and scenic vistas, especially along ridge tops and riparian corridors near the park boundary, is of high value in relation to recreational links and the visitor experience.

Riparian habitat is the most endangered wildlife habitat in the state—less than 10% of the original riparian areas remain intact in Arizona today. Consequently, all four washes that cross Sweetwater Preserve deserve generous protection. They serve wildlife both in the preserve and in surrounding park lands.

At the time (1993), the remaining 480 acres that comprise Sweetwater Preserve were not selected for further consideration in this park boundary study. Although most of this additional acreage contains these park values, Larry Norris, Team Leader for the 1993 Saguaro National Park Service Boundary Expansion Inventory, explained the team's decision: "There were six criteria that we were asked to use in selection of the inventory expansion parcels. Criterion 5 required that the edge configuration resulting from the other criteria must be feasible for resource protection and not create disjunct units or large, unqualified in-holding situations. Our inventory selection was done eight years ago and I can't remember the specifics, but I believe this is the reason it may not have been included."

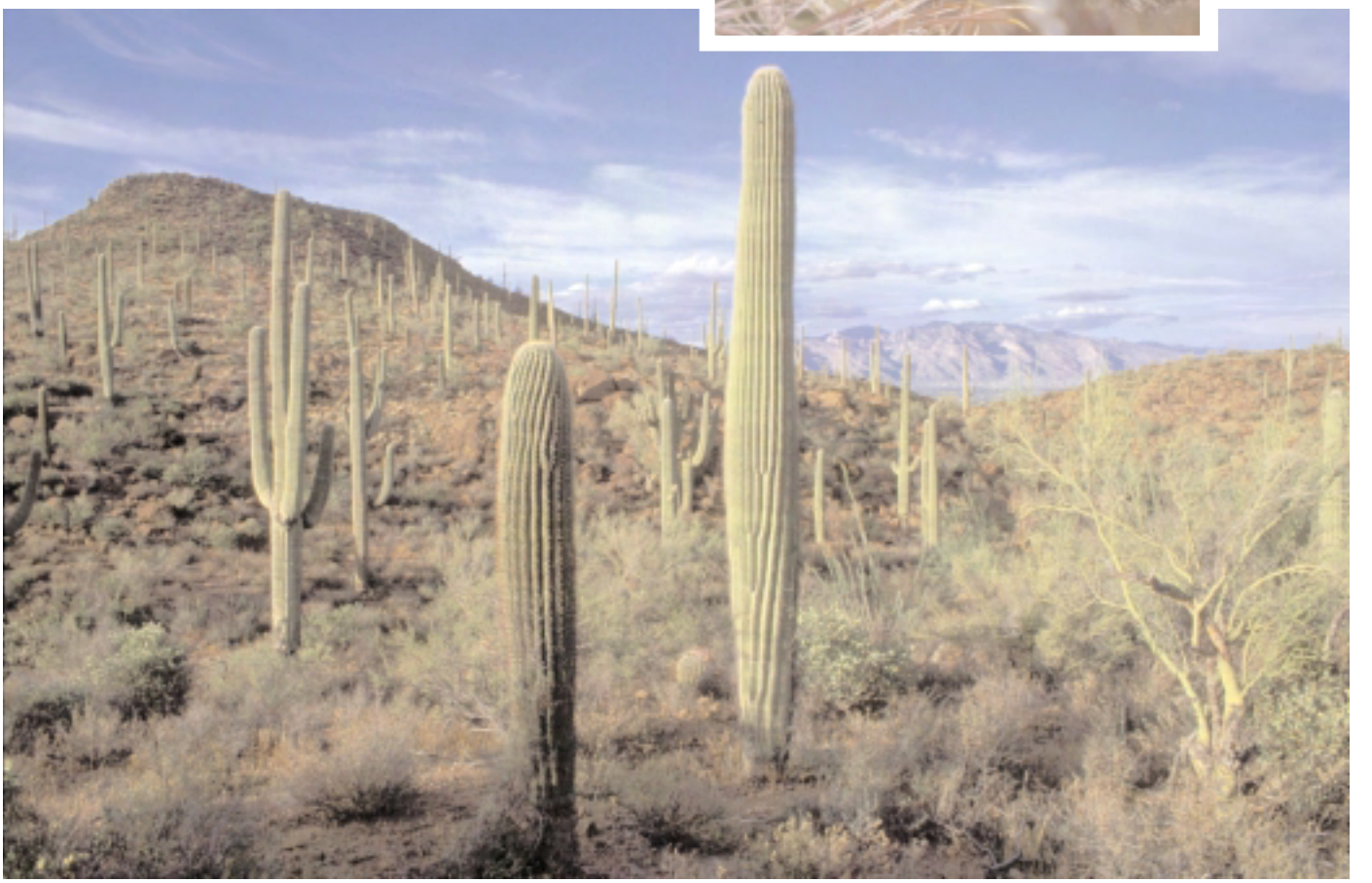
Once the inventory was established, additional work was done to identify interested sellers (in the 1993-1994 time frame). In 1994 the current park boundary was expanded to within one-half mile of Sweetwater Preserve, close enough to merit re-evaluation for further expansion. Consequently, a unique conservation opportunity now exists in the Sweetwater Canyon area. Located here are more than 1,000 acres of undeveloped or extremely low density, biologically rich land that is contiguous with Saguaro National Park West.

SWEETWATER PRESERVE'S LINK TO SAGUARO NATIONAL PARK WEST

Sweetwater Preserve can be connected with the park system for both buffer and wildlife corridors. Only one property owner owns the 40 acres needed to link Sweetwater Preserve to Saguaro National Park West, the University of Arizona's Desert Station, and Tucson Mountain Park—see folded map. We recommend that this parcel be purchased, if at all possible, in conjunction with the acquisition of Sweetwater Preserve

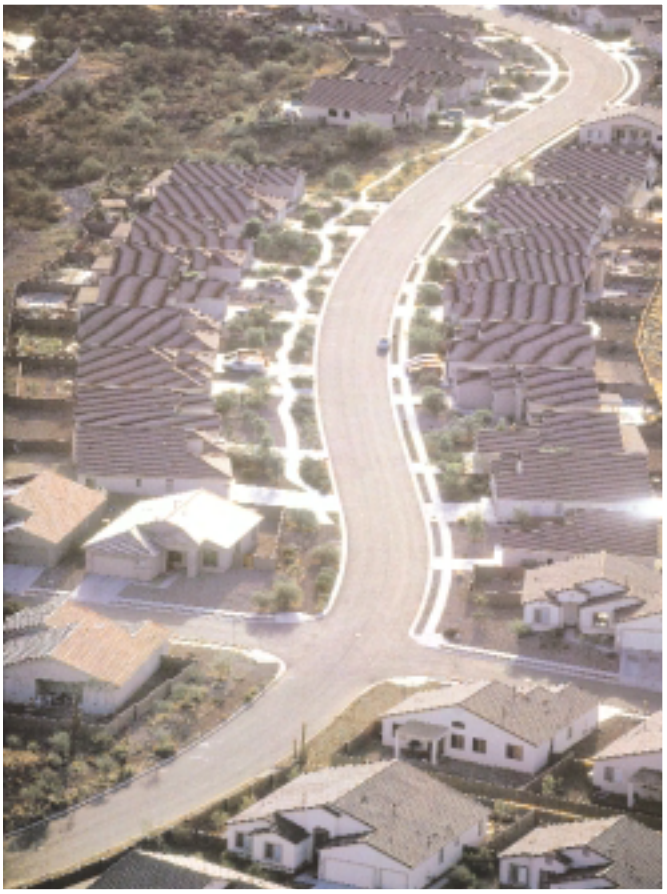
Contiguous properties (see folded map) owned by the Joseph W. Harper & Barbara Shaw Trust, the David Morton Trust, and Thomas Wiewandt (parcels 6, 9, 10, and the 20 acres north-northeast of parcel 9) are deed-restricted to one house per 10 acres, adding an important buffer to this connection with the park lands. Also, the 10-acre parcel east of parcel 9 and the 10 acres east of parcel 10 are owned by the Tucson Mountains Association and the University of Arizona's Department of Architecture, respectively; both are deed-restricted to remain as open space. Other recommendations for park expansion of critical areas were included in *The Next Frontier* report (2000). If action is not taken in a timely manner, Sweetwater parcel 7 will assuredly be purchased by a real estate developer.

We have enthusiastic support from adjacent neighbors in Sweetwater Canyon. Many canyon residents purchased their land with strong conservation-oriented deed restrictions and are already knowledgeable about the Sonoran Desert Protection Plan.



Succulent surprises abound within Sweetwater Preserve. Dense stands of young saguaros and ancient barrel cacti of enormous proportion (top) populate the land. Flowers of the barrel open in July and August during the summer rainy season, providing nectar and pollen for native insects. In autumn, deer, antelope ground squirrels (top right), and curved-billed thrashers are among the animals that feast on its lemon-yellow fruit.

Bottom: View from within Section 26 of Sweetwater Preserve, looking east towards Tucson and the Santa Catalina Mtns. in the distance. Peaks and ridges along the eastern edge of Section 26 hide urban sprawl along Camino del Cerro that is so striking in the aerial photograph on page 11. photos © Thomas Wiewandt



Pristine Sonoran Desert habitat within Sweetwater Preserve stands in sharp contrast to the new Agua Dulce subdivision located by Sweetwater Drive near Camino de Oeste, just 0.5 mi from the proposed preserve. In the Tucson Mountains, our options for the future are quickly vanishing before our eyes. The Sweetwater Preserve parcel is a natural treasure too valuable to lose. We urge you to act swiftly.
photos © Adriel Heisey

BIOLOGICAL RESERVE DESIGNATION UNDER THE SONORAN DESERT CONSERVATION PLAN

The Sonoran Desert Conservation planning process, through a committee of esteemed scientists assembled as the Science Technical Advisory Team (STAT), has developed a Preliminary Conceptual Biologically-based Reserve System. The goal of the Sonoran Desert Conservation Plan is "to ensure long-term survival of the full spectrum of plants and animals that are indigenous to Pima County through maintaining or improving the habitat conditions and ecosystem functions necessary for their survival." The reserve design serves a crucial function under this goal, and the community's charge is to implement a final reserve system that can, as much as possible, fully meet this goal through protection (Carolyn Campbell, personal communication).

Although further refinement is ongoing with the STAT to prioritize areas for protection, all 880 acres of Sweetwater Preserve are included in the Biological Reserve system in the Sonoran Desert Conservation Plan. Currently, 400 of these acres have been identified in the critical habitat/recovery core category. The science committee for the plan is now in the process of defining protection measures and recommending development restrictions for lands to be designated as "reserves" (Carolyn Campbell, personal communication).

CONCLUSION: A CHANCE TO DO THINGS RIGHT

What is happening in the Tucson Mountains is a clear example of a phenomenon that has become emblematic of the contemporary American West: the collision of urban sprawl with wilderness.

A preceding report called *The Tucson Mountains—The Next Frontier* was so named because the Tucson Mountains contain the most open desert of any place within the Middle Santa Cruz Planning Area, and because the forces of sprawl are not just on the doorstep, they are already entering the room.

We also call the Tucson Mountains the Next Frontier because there is still enough left of our precious Sonoran Desert to make this place an example of how to do it right. We have a unique resource in the Tucson Mountains, not just the incredible plant diversity or the abundant wildlife, or the spectacular views. Our greatest resource is our citizens. Many of the residents are committed to desert conservation, our mountain range, and its foothills. The Tucson Mountains Association and its 360 members are unified in the statement of purpose: "To preserve and provide for the scenic quality of the area and to establish and maintain the park and open space areas. To protect the natural habitat in order to preserve the biological diversity. And to do all things necessary and desirable to protect the health and well being of our members and the native flora and fauna." We welcome the prospect of protecting more land in the national park that is our backyard. We embrace stronger protective legislation, whether it is federal, state, or local.

We realize what an incredible opportunity we have had to work with Pima County and the federal government on state-of-the-art conservation planning, and we're committed to seeing it through. The acquisition of the Sweetwater Preserve will be a huge step in making this opportunity a reality.

This time, let's do it right.

CONTRIBUTORS

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Helen Wilson, Natural Systems Consulting

Susan Zakin, Environmental Journalist

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Checklist A

AMPHIBIANS AND REPTILES OF THE TUCSON MOUNTAINS

Compiled by Cecil Schwalbe and Taylor Edwards

The area for this list extends from the Tucson Mountains' crest to the Santa Cruz River to the east and to the lower mountain slopes to the west. This list was compiled from observations from 1973 to the present and from discussions with other biologists and residents. *Asterisks indicate species for which confirmation is needed nearer the mountains. For the most part, common and scientific names conform to Stebbins, R. C., 1985, *A Field Guide to Western Reptiles and Amphibians*, Revised Second Edition, Houghton Mifflin, Boston.

AMPHIBIANS

Couch's spadefoot (*Scaphiopus couchii*)
Great Plains toad (*Bufo cognatus*)
Colorado River toad (*Bufo alvarius*)
Red-spotted toad (*Bufo punctatus*)
Great Plains narrow-mouthed toad (*Gastrophryne olivacea*)

REPTILES

Lizards

Western banded gecko (*Coleonyx variegatus*)
Mediterranean gecko (*Hemidactylus turcicus*) - introduced
Desert iguana (*Dipsosaurus dorsalis*)
Spiny-tailed iguana (*Ctenosaura hemilopha*) - introduced
Lesser earless lizard (*Holbrookia maculata*)
Greater earless lizard (*Cophosaurus texanus*)
Zebra-tailed lizard (*Callisaurus draconoides*)
Common collared lizard (*Crotaphytus collaris*)
Long-nosed leopard lizard (*Gambelia wislizenii*)
Desert spiny lizard (*Sceloporus magister*)
Clark's spiny lizard (*Sceloporus clarkii*)
Side-blotched lizard (*Uta stansburiana*)
Tree lizard (*Urosaurus ornatus*)
Regal horned lizard (*Phrynosoma solare*)
Giant spotted whiptail (*Cnemidophorus burti stictogrammus*)
Sonoran spotted whiptail (*Cnemidophorus sonorae*)
Western whiptail (*Cnemidophorus tigris*)
Gila monster (*Heloderma suspectum*)

Snakes

Western blind snake (*Leptotyphlops humilis*)
Spotted leaf-nosed snake (*Phyllorhynchus decurtatus*)*
Saddled leaf-nosed snake (*Phyllorhynchus browni*)*
Coachwhip (*Masticophis flagellum*)
Sonoran whipsnake (*Masticophis bilineatus*)
Western patch-nosed snake (*Salvadora hexalepis*)
Glossy snake (*Arizona elegans*)
Gopher snake (*Pituophis melanoleucus*)
Common kingsnake (*Lampropeltis getula*)
Long-nosed snake (*Rhinocheilus lecontei*)
Black-necked garter snake (*Thamnophis cyrtopsis*)
Banded sand snake (*Chilomeniscus cinctus*)
Southwestern black-headed snake (*Tantilla hobartsmithi*)
Lyre snake (*Trimorphodon biscutatus*)
Night snake (*Hypsiglena torquata*)
Western coral snake (*Micruroides euryxanthus*)
Western diamondback rattlesnake (*Crotalus atrox*)
Sidewinder (*Crotalus cerastes*)
Black-tailed rattlesnake (*Crotalus molossus*)
Tiger rattlesnake (*Crotalus tigris*)
Mojave rattlesnake (*Crotalus scutulatus*)

Turtles

Desert tortoise (*Gopherus agassizii*)

45 species total

Checklist B

BIRDS OF THE TUCSON MOUNTAINS

Compiled by Roger Wolf, Tucson Audubon Society, Roger Carpenter, and Phil Jenkins
(Species Observed within One Mile of Camino De Oeste & Gates Pass Road)

Great Blue Heron
White-Faced Ibis
Gambel's Quail
Northern Harrier
Cooper's Hawk
Goshawk
Red-Tailed Hawk
Harris Hawk
Golden Eagle
Turkey Vulture
American Kestrel
Prairie Falcon
Barn Owl
Western Screech Owl
Great Horned Owl
Elf Owl
Cactus Ferruginous Pygmy Owl
Mourning Dove
White-winged Dove
Rock Dove (Domestic Pigeon)
White-tipped Dove
Inca Dove
Yellow-billed Cuckoo
Roadrunner
Common Poor-will
Lesser Nighthawk
Rufous Hummingbird
Allen's Hummingbird
Costa's Hummingbird
Black-chinned Hummingbird
Broad-billed Hummingbird
Gilded Flicker
Ladder-backed Woodpecker
Gila Woodpecker
White-throated Swift
Vaux Swift

Brown-crested (Wied's) Flycatcher
Ash-throated Flycatcher
Black Phoebe
Say's Phoebe
Gray Flycatcher
Western Flycatcher
Horned Lark
Purple Martin
Barn Swallow
Violet Green Swallow
Raven
Steller's Jay(1)
Scrub Jay
Bushtit
Verdin
Water Pipit
House Wren
Rock Wren
Cactus Wren
Canyon Wren
Ruby-crowned Kinglet
Golden-crowned Kinglet (1)
Black-tailed Gnatcatcher
Blue-gray Gnatcatcher
Northern Mockingbird
Catbird (1)
Curve-Billed Thrasher
Bendire's Thrasher
Hermit Thrush
Swainson's Thrush
American Robin
European Starling
Phainopepla
Loggerhead Shrike
Solitary Vireo
Gray Vireo

Townsend's Warbler
Hermit Warbler
Black-Throated (Green?)Warbler
Lucy's Warbler
Macgillivray's Warbler
Yellow Warbler
Wilson's Warbler
Kentucky Warbler
Orange-crowned Warbler
Western Meadowlark
Brown-headed Cowbird
Bronzed Cowbird
Hooded Oriole
Scott's Oriole
Summer Tanager
Western Tanager
White-crowned Sparrow
Harris Sparrow
Black-throated Sparrow
Black-chinned Sparrow
Chipping Sparrow
Rufous-winged Sparrow
Song Sparrow
Lincoln Sparrow
Vesper Sparrow
Fox Sparrow
Canyon Towhee
Abert's Towhee
Green-tailed Towhee

Black-headed Grossbeak
Rose-breasted Grossbeak (1)
Lazuli Bunting
Lark Bunting
Pyrrhuloxia
Cardinal
House Finch
Lesser Goldfinch
House Sparrow

Checklist C

MAMMALS OF THE TUCSON MOUNTAINS

Based on personal observations by Roger Carpenter, David Dalton, Phil Jenkins, Karen Krebbs, and data from Cockrum, 1960

Order INSECTIVORA

Desert shrew (*Notiosorex crawfordi*)

Order CHIROPTERA (BATS)

\+ species found at or near the Arizona-Sonora Desert Museum (Karen Krebbs, personal communication)
\+ + species known to roost in the Tucson Mtns. (David Dalton, personal communication)
\+ + + species likely to roost in the Tucson Mountains (David Dalton, personal communication)

California leaf-nosed bat (*Macrotus californicus*) + +
Cave myotis (*Myotis velifer*) + +
Fringed myotis (*Myotis thysonodes*) +
Lesser long-nosed bat (*Leptonycteris curasoae*)
Western pipistrelle (*Pipistrellus hesperus*) + + +
Big brown bat (*Eptesicus fuscus*) + + +
Pallid bat (*Antrozous pallidus*) + + +
Big free-tailed bat (*Nyctinomops macrotis*) +
Mexican free-tailed bat (*Tadarida brasiliensis*) +
Greater mastiff bat (*Eumops perotis*)
Mexican Long-tongued Bat (*Choeronycteris mexicana*)

Order LAGOMORPHA (RABBITS)

Black-tailed jackrabbit (*Lepus californicus*)
Desert cottontail (*Sylvilagus auduboni*)

Order RODENTIA

(RATS, MICE, SQUIRRELS, VOLES, ETC.)

Rock squirrel (*Citellus variegatus*)
Harris ground squirrel (*Ammospermophilus harrisi*)
Round-tailed ground squirrel (*Ammospermophilus tereticaudus*)
Valley pocket gopher (*Thomomys bottae*)
Arizona pocket mouse (*Perognathus amplus*)
Long-tailed pocket mouse (*P. formosus*)
Desert pocket mouse (*P. peniclillatus*)
Rock pocket mouse (*P. intermedius*)
Banner-tailed kangaroo rat (*Dipodomys spectabilis*)
Merriam's kangaroo rat (*D. merriami*)
Southern grasshopper mouse (*Onychomys torridus*)
Western harvest mouse (*Reithrodontomys megalotis*)
Cactus mouse (*Peromyscus eremicus*)
Merriam's mouse (*P. merriami*)
Deer mouse (*P. maniculatus*)
Hispid cotton rat (*Sigmodon hispidus*)
White throated wood rat (*Neotoma albigula*)
House mouse (*Mus musculus*; non-native)

Order CARNIVORA

Coyote (*Canis latrans*)
Grey fox (*Urocyon cinereoargenteus*)
Ring-tailed cat (*Bassariscus astutus*)
Raccoon (*Procyon lotor*) - present and increasing
Spotted skunk (*Spilogale putorius*)
Striped skunk (*Mephitis mephitis*)
Hooded skunk (*Mephitis macroura*)
Mountain lion (*Felis concolor*)
Bobcat (*Lynx rufus*)

Order ARTIODACTYLA (Even-Toed Ungulates)

Javelina (*Tayassu tajacu*)
Mule deer (*Odocoileus hemionus*)