



**PIMA COUNTY NATURAL RESOURCES,
PARKS AND RECREATION DEPARTMENT**

.....
**TUCSON MOUNTAIN PARK
MANAGEMENT PLAN**

BACKGROUND REPORT
.....



November 2007

**PREPARED BY:
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1.1 Introduction:

Tucson Mountain Park (TMP) is a 37 square mile natural resource park encompassing the southern portion of the Tucson Mountain range in Pima County, Arizona. The park is owned by Pima County and managed by the Pima County Natural Resources, Parks, and Recreation Department.

Tucson Mountain Park was established in 1929 to preserve the natural and scenic resources of the Tucson Mountains and to provide opportunities for outdoor recreation in a natural setting. Nearly eighty years later, the park continues to be managed for these important public purposes.

While the purpose has remained constant, the park setting has changed dramatically over the past eight decades. In 1929, the Tucson basin had a population of 32,506 and an urbanized area covering a few square miles east of the mountain range. Today, the population of the metropolitan area has grown to over 1,000,000 and the urban area covers more than 200 square miles. Development is no longer limited to the east side of the Tucson Mountains and extends around the entire mountain range.

As a result of this growth, public use of Tucson Mountain Park has increased significantly in recent years. New uses and greater visitation are impacting the park from within. At the same time, population growth, urban development, and other external factors are impacting the park from the outside. These internal and external impacts will persist as the Tucson metropolitan area continues to grow.

As the Tucson community has grown so, too, has the importance of Tucson Mountain Park as a large tract of natural open space. It remains the cornerstone of the Pima County Mountain Park and Preserve system. It is a key component of the County's Conservation Land System. It also remains an important and popular recreation area that serves local citizens and tourists from around the world.

1.2 Purpose of Document:

This Background Report is the first of two principal documents prepared as part of the Tucson Mountain Park Management Plan project. The second will be the Management Plan which will identify specific policies and prescriptions for the management and operation of the park.

The purpose of this Background Report is to summarize the best available information related to the resources of the Tucson Mountain Park. As such, it includes information on the site's physical, biological, cultural, and visual resources. It also includes information on the existing infrastructure and existing park facilities.

In addition to specific data related to the park, this document includes information related to the park's setting. This information is provided to foster an understanding of the external conditions that impact and influence the resources of the park.

1. Introduction

This Background Report will be used as a reference by Tucson Mountain Park managers and the staff of the Pima County Natural Resources, Parks, and Recreation Department as they implement the policies and management prescriptions included in the Management Plan.

The Background Report will also be utilized during the development of the Management Plan. The plan will provide for the adaptive management of the park. As such, it will include recommendations for the monitoring of resource conditions. It will also include guidelines for responding to changes observed.

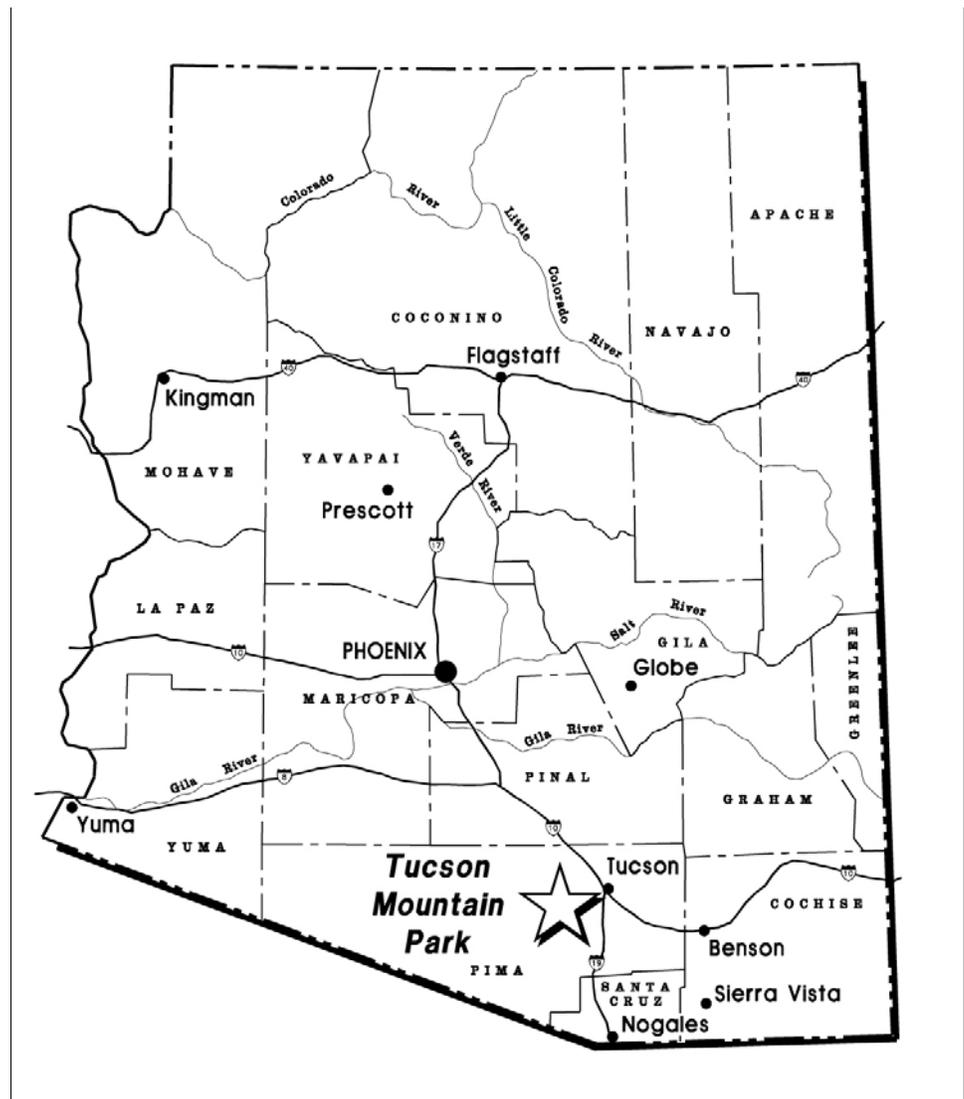


Figure 1-A: Location Map

2. The Project Site

2.1 The Project Site: For purposes of the Tucson Mountain Park Management Plan, there are four separate areas that collectively form the park. These include:

- Areas that have historically been part of Tucson Mountain Park
- The Central Arizona Project (CAP) Wildlife Mitigation Corridor
- The Robles Pass Trails Park
- A tract of adjacent land that will be transferred from the Bureau of Land Management (BLM) to the Pima County Natural Resources, Parks, and Recreation Department for incorporation into the park.

A map illustrating the location, size, and configuration of these sub-areas is included as Figure 2-A.

2.2 Areas Historically Included in Tucson Mountain Park: When Tucson Mountain Park was established in 1928, the site consisted of approximately 28,980 acres. In the years that followed, various land transactions expanded the size of the park. In 1961, a portion of the original park was transferred to the federal government to create the Tucson Mountain Unit of Saguaro National Monument. In 1994, the Monument became Saguaro National Park.

For the past four decades, approximately 19,000 acres, has been continuously operated and maintained by Pima County as Tucson Mountain Park. This acreage encompasses the park's most prominent peaks and landforms including; Golden Gate Mountain, Tower Peak, Bushmaster Peak, Bren Mountain, and Brown Mountain. It also encompasses the park's most popular public use areas including; the Gates Pass Overlook, the various picnic areas, and the TMP trail system. Also present in this area are the Arizona Sonora Desert Museum and Old Tucson, leased facilities that are within the boundaries of Tucson Mountain Park.

2.3 Central Arizona Project Wildlife Mitigation Corridor: The Tucson Aqueduct portion of the Central Arizona Project canal system extends through Avra Valley west of Tucson Mountain Park. When the canal was constructed, it was understood that it would be a barrier to wildlife movement between Tucson Mountain Park and the mountain ranges and valleys to the west. To mitigate this impact, a 2,721 acre tract of land was set aside as a mitigation corridor. Additionally, land bridges were constructed above the canal to facilitate the safe movement of wildlife across the aqueduct.

The subject land is owned by the federal government and managed by the Pima County Natural Resources, Parks, and Recreation Department. The County's management of the land is based on a "Cooperative Agreement for the Use of Project Lands for Wildlife and Plant Conservation and Management, Tucson Mitigation Corridor, Central Arizona Project." (See Appendix A).

2. The Project Site

The Cooperative Agreement references a “Tucson Mitigation Corridor Master Management Plan.” (See Appendix B). This plan:

- Precludes development within the corridor
- Mandates that the site be managed to protect wildlife and plant species
- Prohibits mining, grazing, the discharge of firearms, trapping, recreational development, and off-road vehicle use

Pima County’s obligations under this plan include requirements to:

- Maintain two wildlife watering sites
- Maintain and repair perimeter fencing and signs
- Maintain locked gates so as to control motor vehicle access to the site
- Remove trash from the site
- Enforce applicable laws and regulations

Pima County receives an annual stipend for the performance of these tasks. More importantly, the County receives the benefits that accrue from having 2,721 acres of natural open space adjacent to Tucson Mountain Park.

The Cooperative Agreement between Pima County and the federal government is subject to periodic renewal. It is anticipated that this agreement will be renewed and will continue without significant modification.

2.4 Robles Pass Trails Park:

During the period from 2000 through 2006, Pima County acquired 1,014 acres of land in the Robles Pass area at the southern end of the Tucson Mountains. This land is in Sections 32, 33, and 34, T14S - R13E. (See Figure 2-A). The subject property is located south of State Route 86 (Ajo Way) and is separated from Tucson Mountain Park by the highway right-of-way. The southern boundary of this parcel shares a short common boundary with Manzanita Park, a Pima County urban park serving the residents of southwest Tucson.

This land was acquired for its biological, visual, and recreational resource value. It consists of rugged hills with native vegetation. The hills associated with this site, combined with the hills in Tucson Mountain Park, form a scenic gateway for travelers entering the City of Tucson from the west. With the exception of a few old jeep trails, the site is undeveloped.

The Pima County Natural Resources, Parks, and Recreation Department will manage this area as a zone or sub-area within the overall Tucson Mountain Park. The Department intends to construct trails for use by hikers, mountain bicyclists, and equestrians. Access and staging for the Robles Pass Trails Park will be through Manzanita Park. The Department is also collaborating with the Arizona Department of Transportation (ADOT) on the design of an eco-duct or grade-separated passageway below the highway that will facilitate park user and wildlife movement between that portion of Tucson Mountain Park north of State Route 86 and the Robles Pass Trails Park.

2.5 BLM Expansion Area:

Adjacent to Tucson Mountain Park's southern boundary is a 1,024 acre parcel of land that is currently owned by the federal government and managed by the Bureau of Land Management (BLM). (See Figure 2-A). The relatively small size of this parcel, and its location in an urban area, make this parcel unsuitable for the land uses and activities that traditionally have occurred on BLM managed lands.

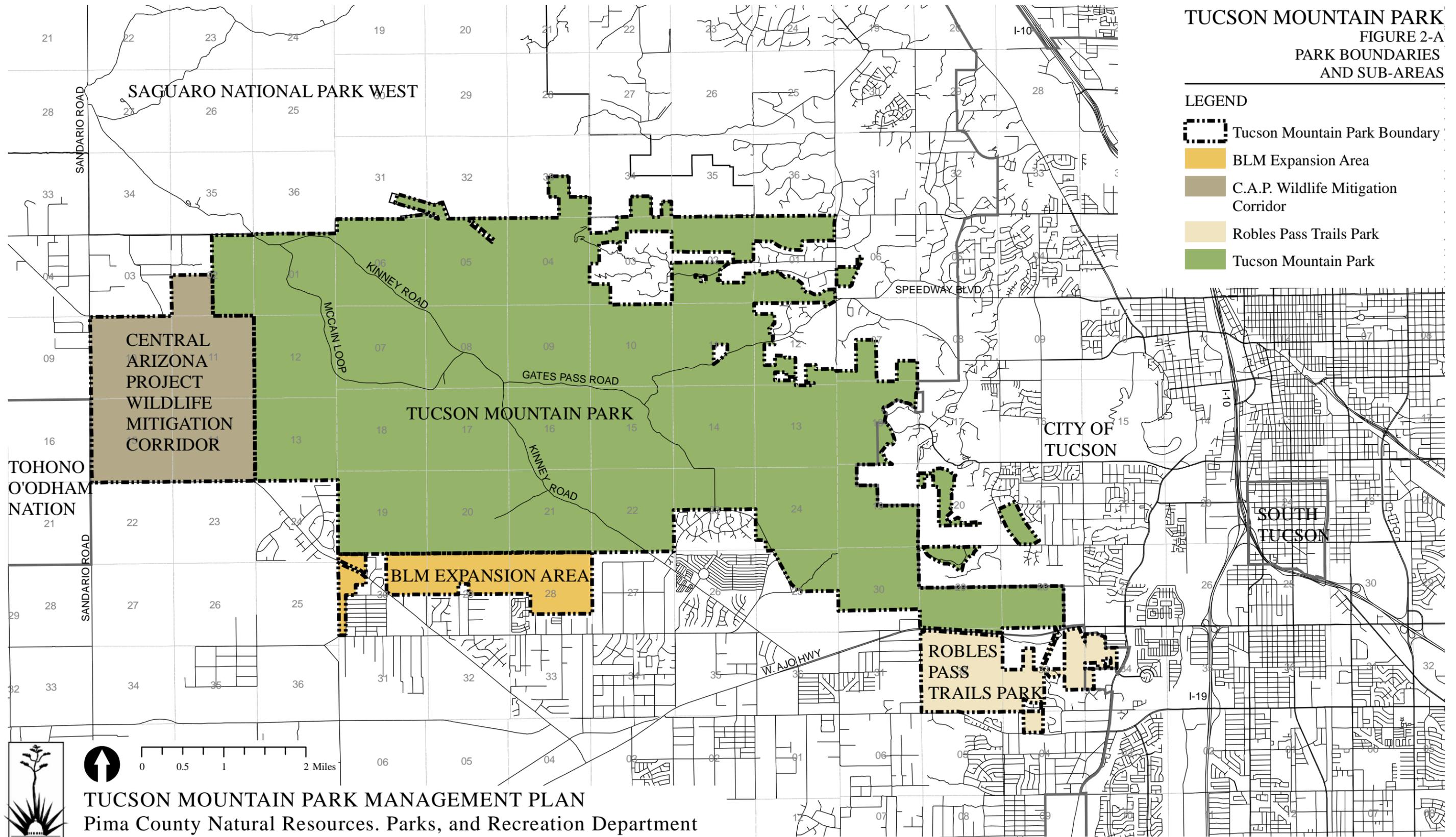
Conversely, the fact that the parcel is adjacent to the park, is largely undeveloped, and is in the same watershed as a portion the park, make it an ideal addition to Tucson Mountain Park.

The Pima County Natural Resources, Parks, and Recreation Department and the Bureau of Land Management are currently working cooperatively to effect the transfer of this property to Pima County for inclusion in Tucson Mountain Park. This transfer is being implemented under the 1954 Recreation and Public Purposes Act (68 Statute 173, 43United States Code 869 et. seq.). All parties have agreed in principle to this action but it will require a period of time to complete. When completed the 1,024 acre parcel will be considered an integral part of Tucson Mountain Park.

TUCSON MOUNTAIN PARK
FIGURE 2-A
PARK BOUNDARIES
AND SUB-AREAS

LEGEND

-  Tucson Mountain Park Boundary
-  BLM Expansion Area
-  C.A.P. Wildlife Mitigation Corridor
-  Robles Pass Trails Park
-  Tucson Mountain Park



0 0.5 1 2 Miles

TUCSON MOUNTAIN PARK MANAGEMENT PLAN
 Pima County Natural Resources, Parks, and Recreation Department

Prepared by McGann & Associates Landscape Architects and Planners

3. History of Tucson Mountain Park

3.1 Park History:

Some of the earliest human settlements in the Tucson Basin were in the vicinity of the Tucson Mountains. The use of the lands currently within Tucson Mountain Park can be traced back to these early human settlements.

Human use of the area continued and expanded through the middle of the 19th century. Growth was particularly rapid following the end of the Civil War. By 1880, the population of Tucson had reached 7,000 and in 1883 a road was built over the Tucson Mountains by Robert Gates, a local saloon keeper and miner. The road passed through the mountains in the location of what is now known as Gates Pass.

At the time of Arizona statehood in 1912, much of the land within the Tucson Mountains was federal land. As federal land, the area was open to homesteading and mining. In 1928, a Pima County agricultural agent, C.B. Brown, traveled through the area and was greatly impressed with the dense stands of saguaro cacti and the other natural features present. He urged that the lands within what is now Tucson Mountain Park and the Tucson Mountain Unit of Saguaro National Park be set aside as a natural area. In 1929, at the request of U.S. Senator Carl Hayden, the Department of the Interior withdrew 29,988 acres of land in the area from mining and homesteading and the area became a public park.

Pima County leased a portion of the subject land from the federal government in 1930 under the provisions of the Park Act of 1926. The annual rental rate was three cents (\$0.03) per acre. The balance of the withdrawn lands were leased by Pima County the following year and Tucson Mountain Park was established as a unit of the Pima County Park system. For many years to follow, Tucson Mountain Park was the largest county park in the nation.

In 1931, the first trail was constructed to the top of Amole Peak. Also constructed during the early 1930's were many of the park roads that exist today.

In 1932, the Pima County Board of Supervisors appointed a commission of five men to assist the Board with the administration of the newly created park. These individuals were T.D. Mallory of the Tucson Natural History Society, L.B. Hart of the Tucson Game Protective Association, Stanley Kitt of the Tucson Chamber of Commerce, and Dr. E.P. Mathewson and C.B. Brown representing the public at-large.

Soon after, in 1933, New Deal Emergency Work Act was signed into law. This legislation created the Works Progress Administration (WPA), the Civilian Conservation Corps (CCC), and the Emergency Conservation Work program. These agencies and programs were established “for the relief of unemployment through the performance of useful public work...” They quickly resulted in the establishment of work camps funded by the U.S. Army and supervised by the National Park Service (NPS) and the Forest Service (USFS).

3. History of Tucson Mountain Park

Between 1933 and 1945, the public works projects undertaken by the WPA, CCC, and ECPW contributed to the national and local efforts to recover from the Great Depression. During this period, local governments, with the cooperation of state and federal agencies, defined public works project that would provide immediate employment and that had potential for future economic benefit to the local community.

During this same period of time, Arizona's economy was beginning to experience a shift away from ranching and toward tourism. Coincident with this rise in tourism was the establishment of Tucson Mountain Park and Saguaro National Park's East Unit. Recognizing the potential of these parks to attract tourists, Pima County applied to the federal government for the funding of park infrastructure and public use facility projects under the Emergency Conservation Work Program. Between 1933 and 1945 numerous projects of this type were implemented in Tucson Mountain Park and in Saguaro National Park's East Unit. Similar facilities were constructed at Colossal Cave and at Sabino Canyon.

When first established, Tucson Mountain Park encompassed approximately 46 square miles. The park extended west from the ridgeline of the Tucson Mountains. It was for this original configuration that a Park Master Plan was prepared by the National Park Service in 1937. A copy of this original Master Plan is included herein as Figure 3-A. The 1937 Master Plan proposed the retention, expansion, and development of roads, trails, picnic areas, and similar improvements.

Also depicted on the 1937 Master Plan are many of the facilities that were subsequently constructed by the Civilian Conservation Corps. These include roads, structures, recreation areas, dams, and drainage facilities. These facilities, or remnants thereof, can be observed in the park today.

The 1937 Master Plan proposed the construction of several picnic areas, that would serve as destinations for day-trips into the park. Some of these were named for the natural features such as Signal Hill and Valley View. Others, such as Juan Santa Cruz were named for historical figures. Many were given Tohono O'Odham names, including; Cam-Boh, Es-Kim-In-Zen, Sus, Mam-a-Gah, and See-Vee-Oi. The Master Plan also shows a Boy Scout Camp and "Camp Papago." At the time of the master plan, Camp Papago was the Pima County Preventorium, a public health facility isolated and housed individuals who had been diagnosed with tuberculosis, but did not yet have an active form of the disease. Camp Papago subsequently closed and was redeveloped as the Gilbert Ray Campground.

Also illustrated on the initial Master Plan is Camp Pima SP-6-A. This facility, located at the northwestern corner of the park, was used as a residential facility for individuals employed by the Emergency Conservation Work Program.

3. History of Tucson Mountain Park

As part of the 1937 National Park Service Master Plan, a singular, rustic design ethic was adopted that sought to have all park improvements harmonize with their surroundings. This ethic is summarized in the book, Park and Recreation Structures, written in 1936 by Amo B. Cammerer, then the Director of the National Park Service. The following is an excerpt from this publication.

“In any area in which the preservation of the beauty of Nature is a primary purpose, every proposed modification of the natural landscape.... deserves to be most thoughtfully considered. A basic objective of those who are entrusted with the development of such areas..... is to hold these modifications to a minimum and so to design them that, besides being attractive to look upon, they appear to belong to and be a part of their settings.

The features to be emphasized and stressed for appreciation in parks.... are the natural features, not the man-made. After all, every structural undertaking in a natural park is only a part of a whole. The individual building or facility must bow deferentially before the broad park plan, which is the major objective, never to be lost sight of.”

To ensure that this objective was consistently carried out, the National Park Services employed Clinton F. Rose as the landscape architect for the Park. Working in cooperation with local architects, Rose was responsible for the design and planning of the recreation areas and improvements within Tucson Mountain Park. Clinton Rose also coordinated the design of facilities at Colossal Cave east of Tucson and South Mountain Park in Phoenix.

In 1939, Old Tucson was constructed by Columbia Pictures within the boundary of Tucson Mountain Park. Over the next 56 years, it was used as the setting for the filming of numerous western theme movies. Much of the original Old Tucson was burned in a fire in 1995. The facility was subsequently rebuilt as a western theme park. It reopened in 1997 but with limited facilities for movie production.

In the early 1950's, the idea of a trailside museum with nature trails and plant and animal displays was proposed for Tucson Mountain Park. This initial proposal grew to become the Arizona-Sonora Desert Museum, which today draws visitors from around the world.

The Arizona-Sonora Desert Museum and Old Tucson both operate on leased land within Tucson Mountain Park. Additional information on these leased facilities is included in Section 12 of this report.

3. History of Tucson Mountain Park

Beginning in about 1933, Pima County began to procure lands within the park that it had previously leased from the federal government. These lands were patented under the Recreation Act of 1926 and under the revised Recreation and Public Purposes Act of 1954. Limitations on the amount of land that could be patented each year made this an extended process. As such, the acquisition process continued through the year 2002. When the subject park lands were patented, the federal government retained the rights to all minerals and the right to mine and remove these minerals.

In 1959, the United States Department of the Interior issued a Public Land Order (No. 1963) that would have reversed the 1929 withdrawal and reopened 7,600 acres of land within Tucson Mountain Park to mining entry. This action was met with intense local opposition spearheaded by the Pima County Board of Supervisors. Their efforts, and the efforts of local citizens, resulted in the order being rescinded and the area was again closed to mining.

In 1960, a bill was introduced in Congress by Arizona Congressman Stewart Udall proposing that a portion of Tucson Mountain Park be made a part of Saguaro National Monument. (The Rincon Unit of the Saguaro National Park, located on the east side of the Tucson metropolitan area, had been established in 1933). This bill never got out of committee. In 1961, Senator Barry Goldwater became involved and introduced legislation in the Senate that would have transferred ownership of the entire mountain park to Pima County so that the Department of the Interior would no longer have control over the disposition of the land. A few months later, Rep. Mo Udall, who replaced his brother in the House of Representatives when Stewart Udall became Secretary of the Interior, proposed H.R. 8365. This legislation would have transferred 15,360 acres of the mountain park to Saguaro National Monument. Senator Hayden concurrently introduced the same legislation in the United State Senate.

Before actions could be taken on these bills, Stewart Udall, the Secretary of the Interior, persuaded President Kennedy to transfer the subject lands to Saguaro National Monument. President Kennedy issued Presidential Proclamation 3439 on November 15, 1961. This proclamation transferred 15,360 acres to the National Park Service as the Tucson Mountain Unit of Saguaro National Monument.

In 1994, the Monument became Saguaro National Park. Additional lands have subsequently been added to both the Rincon and Tucson Mountain Units of the National Park.

In 1975, Pima County and students from the University of Arizona prepared a master plan entitled "A Plan for Tucson Mountain Park." This document proposed the minor expansion and improvement of existing facilities. It also carried forward the concept of preserved natural open space with limited development and public use.

3. History of Tucson Mountain Park

During the following two decades, the park was managed under the general guidelines set forth in the Master Plan and under policies and regulations recommended by park staff and adopted by the Pima County Parks and Recreation Department and the Pima County Parks and Recreation Commission.

By 1998, the population of the Tucson metropolitan area had grown to approximately 800,000 and urban development was occurring at the boundary of the park. The staff of the Department understood that opportunities for expanding the park and for preserving linkages with other natural resource areas were rapidly disappearing. In response to this condition, the “Tucson Mountain Park - Phase One Planning Study” was initiated. Using available data, this study summarized the existing conditions within the park and identified surrounding areas where land acquisition and park expansion should be given priority. Many of the suggested acquisitions have subsequently been completed.

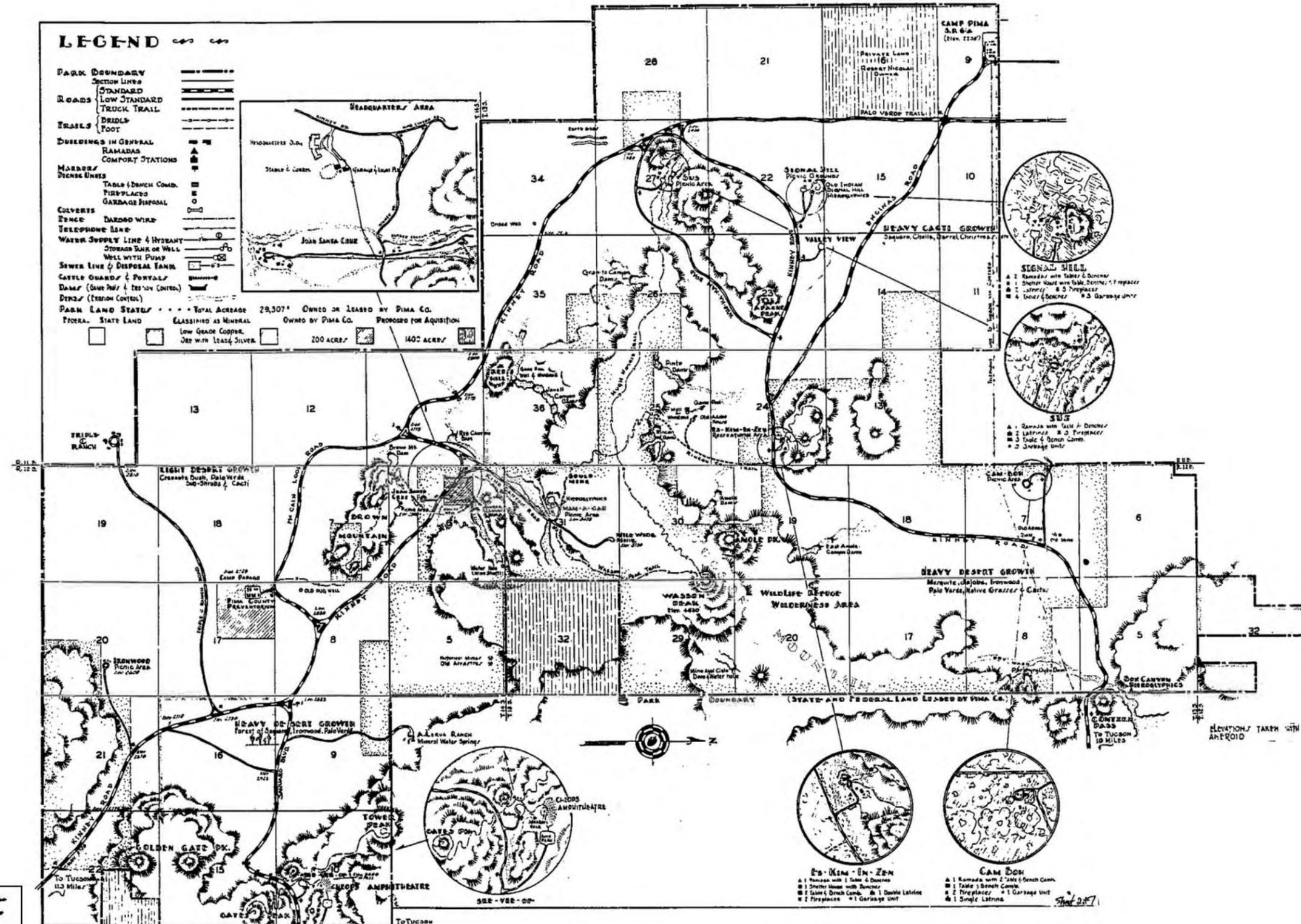
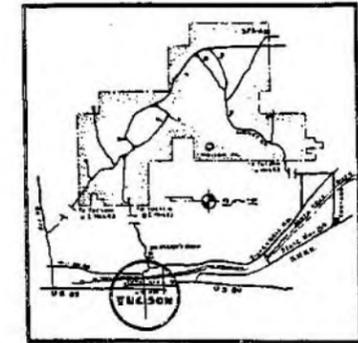
The 1998 a planning study was also undertaken in response to perceived changes in user demand and user activities. The number of park visitors was unknown but clearly increasing. The absence of visitation data was due to the multiple entrances into the park, none of which were controlled or monitored. This remains the condition today. In addition to increasing visitation, new uses were being observed.

When the 1975 Master Plan was prepared by the University of Arizona, mountain bikes were being used by a few individuals riding on prototypes they constructed by hand. By 1998, mountain biking was a very popular activity in the park and several million mountain bikes were being sold in the United States each year. It was clear to park managers that there was a growing need to address these trends and changes. The Phase One Planning Study recommended that a comprehensive assessment of the park be conducted and that a Management Plan be developed. The current Management Plan project is the result of that recommendation.

In 2001, the Pima County Comprehensive Land Use Plan and the Sonoran Desert Conservation Plan were adopted by the Board of Supervisors. These were noteworthy events in the history of the park. These planning documents identified Tucson Mountain Park as a Multiple-Use Management Area in conjunction with the County’s Conservation Land System (CLS). Their adoption reinforced the 70-year policy of managing the park for both resource conservation and appropriate public use.

The past several years of the park’s history have been characterized by key acquisitions, the development of strategically located trailheads, and continued growth in park visitation and use.

TUCSON MOUNTAIN PARK
 FIGURE 3-A
 1937 MAP OF
 TUCSON MOUNTAIN PARK



UNITED STATES
 DEPARTMENT OF THE INTERIOR
 NATIONAL PARK SERVICE
 COOPERATING WITH
 PIMA COUNTY PARK BOARD-TUCSON

TUCSON MOUNTAIN PARK
 BASE-MAP

Prepared by: [Signature]
 Date: 7-20-37
 Checked by: [Signature]
 Date: []
 Approved by: [Signature]
 Date: []

S.F.



TUCSON MOUNTAIN PARK MANAGEMENT PLAN
 Pima County Natural Resources, Parks, and Recreation Department
 Prepared by McGann & Associates Landscape Architects and Planners

4. Existing Conditions Surrounding Park

4.1 Introduction

When established in 1928, Tucson Mountain Park was on the edge of the City of Tucson. East of the park was a relatively small urbanized area. The lands south, west, and north of the park were undeveloped desert. In the intervening years, the community has grown and development now surrounds the park. Instead of being an edge, Tucson Mountain Park has become an island within the metropolitan area. This changed setting has and will continue to impact the park.

4.2 Existing Land Ownership:

The ownership of land surrounding Tucson Mountain Park is characterized by private ownership and ownership by the State of Arizona and the United States federal government. (See Figure 4-A).

The land northeast and east of the park is almost exclusively in private ownership. An exception is a 58.5 acre parcel of State Trust land adjacent to the existing park boundary and near Trails End Road. This parcel, located in Section 2 (T14S-R12E), has been identified by the Pima County Natural Resources, Parks, and Recreation Department as a candidate parcel for future acquisition.

A noteworthy feature of land ownership east of the park is the presence of privately owned lands on the east face of the mountain range along Trails End Road and Hidden Canyon Drive in Section 3 (T14S-R12E). This area is likely to remain an island of low-density residential development that is nearly surrounded by the park. While the density of development in this area is low the visibility of the houses and roads constructed is high due to the steep slopes that face the Tucson metropolitan area.

The ownership of land to the southeast is similarly characterized by private ownership, with two key exceptions. One is Kennedy Park, a City of Tucson Regional Park, which is located immediately east of the site and north of State Route 86 (Ajo Way). The second is a 41.2 acre parcel of State Trust Land adjacent to the Robles Pass Trails Park in Section 33 (T14S-R13E). The location of this land makes it a candidate for acquisition and incorporation into Tucson Mountain Park.

The lands south of the park are typically in private ownership. There are scattered parcels of State Trust Land and BLM managed federal land in this area but they are separated from the park by up to several miles. (See Figure 4-A).

In the vicinity of the southwest corner of Tucson Mountain Park, there are two parcels of State Trust Land totaling approximately 1,900 acres. These parcels, which are located in Sections 23, 25, 26, and 36 (T14S-R11E), are bisected by the Central Arizona Project Tucson Aqueduct. The westernmost parcel shares a one mile long common boundary with the Mitigation Corridor. The proximity of these parcels to Tucson Mountain Park make them candidates for future acquisition.

4. Existing Conditions Surrounding Park

Land ownership west of the park is a combination of tribal, private, and federal lands. The Tohono O’Odham Nation tribal lands are separated from the park by the Sandario Road right-of-way. Private lands occur west of Sandario Road and north of the Mitigation Corridor. Ironwood National Monument is located west and northwest of the park.

Saguaro National Park lies to north. Tucson Mountain Park and Saguaro National Park share a 5.5 (+/-) mile long common boundary in this location. The area northeast of the park is characterized by private land ownership.

4.3 Existing Land Use:

Areas northeast and east of the park are characterized by low-density residential development. (See Figure 4-B). This land use pattern extends for several miles to the east into the City of Tucson.

An exception to this pattern of low-density residential development is the J.W. Marriott Starr Pass Resort located in Section 18 (T14S-R13E). The resort complex includes a 575 room hotel and conference center, a spa, restaurants, and a 27-hole golf course. The resort property is adjacent to Tucson Mountain Park.

An additional land use feature east of the park is the Tucson Water utility’s Clearwater Reservoir located in Section 19 (T14S-R13E). This above-ground, covered reservoir is one of Tucson Water’s principal storage facilities. Vehicular access to the reservoir site is critical although the volume of vehicular traffic is very low. Site security is of concern to the water utility. Tucson Water would prefer to have limited public use in those portions of the park near the reservoir.

Residential land uses predominate south and southwest of the Park. These areas are characterized by medium to low density subdivisions. Some vacant parcels are present but a substantial portion of the area immediately south of the park has been subdivided and built-out.

The largest residential project in the area south of the park is Tucson Estates. This subdivision is located in Sections 23, 25, and 26 (T14S-R1ES). Development associated with this retirement community includes medium and low density residential areas with some commercial properties. The residents of Tucson Estates make extensive use of the park’s trail system and other facilities.

Those portions of the Tohono O’Odham Nation that lie west of the park are undeveloped or are being used for agricultural purposes. It is anticipated that these land uses will continue, with the possibility of some of the undeveloped land being cleared and planted for agricultural production.

The privately owned lands west of the park consist of low-density residential developments and undeveloped properties. New residential construction is ongoing in this area and it is anticipated to continue.

4. Existing Conditions Surrounding Park

In this location, houses are being constructed on parcels created by lot splits. Because Arizona law allows for these lot splits, development can occur without a platted subdivision and the associated County review processes. As a result, Pima County has limited ability to regulate growth and new residential development on the privately owned lands west of the park.

Saguaro National Park lies north of Tucson Mountain Park. This land will remain a National Park in-perpetuity.

4.4 Existing Zoning:

The existing Pima County zoning designations for lands surrounding the park are shown in Figure 4-C. Medium to low-density residential zoning districts predominate. There are also some parcels of land that are zoned for commercial, office, and/or other non-residential uses.

The current zoning of adjacent parcels, while important, does not adequately describe future development and land use in the areas surrounding Tucson Mountain Park. This is due to the likely re-zoning of much of the land. These rezonings are supported by the Pima County Comprehensive Plan.

4.5 Comprehensive Plan Land Use Designations:

The 2001 Pima County Comprehensive Plan establishes general guidelines for land-use and development within unincorporated Pima County. In the vicinity of Tucson Mountain Park, several different land use intensities are proposed. (See Figure 4-D). These include Regional Activity Center, Medium to High Intensity Urban, Low Intensity Urban, and Resource Transition.

Regional Activity Center:

The Regional Activity Center is proposed for areas near the intersection of State Route 86 (Ajo Way) and Kinney Road. It is in this location that a new Wal-Mart Super Center is proposed. Provided below is the description of a Regional Activity Center as included in the Comprehensive Plan.

- Purpose: To designate high intensity mixed-use areas designed to provide the fullest range of goods and services and compatible multiple residential housing.
- Objective: Goods and services are provided that attract customers living significant distances from the center. A regional shopping mall may be the nucleus of the activity center. The center provides a variety of high density housing types and employment opportunities, including government services and educational institutions. The center has direct access to regional transportation facilities, including public transit and pedestrian and bicycle paths. Regional Activity Centers are generally greater than one hundred acres in size.

4. Existing Conditions Surrounding Park

- Residential Gross Density: Only land area zoned and planned for residential use, or natural or cluster open space areas, shall be included in gross density calculations. Natural and cluster open space shall be defined as set forth in Section 18.09.040B, except that cluster open space shall not include land developed under the GC Golf Course Zone. Residential gross density shall conform with the following (RAC = Residences per Acre):
 - Minimum - 12 RAC
 - Maximum - 44 RAC

Medium to High Intensity Urban:

Medium to high intensity land use is proposed for the Tucson Estates area and for areas south of State Route 86. In the case of Tucson Estates, this land use intensity reflects existing conditions. The Comprehensive Plan definition of Medium to High Intensity Urban is as follows:

- Purpose: To designate areas for a mix of medium to high density housing types and other compatible uses.
- Objective: These areas provide opportunities for a variety of residential housing types, including cluster option developments, single family attached dwellings, and apartment complexes. Special attention should be given in site design to assure that uses are compatible with adjacent lower density residential uses.
- Residential Gross Density: Only land area zoned and planned for residential use, or natural or cluster open space areas, shall be included in gross density calculations. Natural and cluster open space shall be defined as set forth in Section 18.09.040B, except that cluster open space shall not include land developed under the GC Golf Course Zone. Residential gross density shall conform with the following:
 - Minimum - (none)
 - Maximum - 24 RAC

Low Intensity Urban:

This land-use designation has been assigned to certain areas south and northeast of the park. The Comprehensive Plan definition of Low Intensity Urban is as follows:

- Purpose: To designate areas for low density residential and other compatible uses; to provide incentives for clustering residential development and providing natural open space; and to provide opportunities for a mix of housing types throughout the region.

4. Existing Conditions Surrounding Park

- Residential Gross Density: Only land area zoned and planned for residential use, or natural or cluster open space areas, shall be included in gross density calculations. Natural and cluster open space shall be defined as set forth in Section 18.09.040B, except that cluster open space shall not include land developed under the GC Golf Course Zone. Projects utilizing any of the cluster options set forth in this section shall conform with the provisions of Section 18.09.040 Cluster Development Option. Residential gross density shall conform with the following:
 - Low Intensity Urban - 3.0:
 - Minimum - (none)
 - Maximum - 3.0 RAC.
 - Low Intensity Urban - 1.2:
 - Minimum - (none)
 - Maximum - 1.2 RAC.
 - Low Intensity Urban - 0.5:
 - Minimum - (none)
 - Maximum - 0.5 RAC.
 - Low Intensity Urban - 0.3:
 - Minimum - (none)
 - Maximum - 0.3 RAC..

Resource Transition:

The Resource Transition land use intensity has been assigned to much of the land adjacent to Tucson Mountain Park. (See Figure 4-D). The Comprehensive Plan definition of this land use intensity is as follows:

- Purpose: Private land with environmentally sensitive characteristics that include wildlife corridors, natural washes, floodplains, peaks and ridges, buffers to public preserves, and other environmentally sensitive areas. Development of such land shall emphasize design that blends with the natural landscape and supports environmentally sensitive linkages in developing areas.
- Residential Gross Density: Only land area zoned and planned for residential use, or natural or cluster open space areas, shall be included in gross density calculations. Natural and cluster open space shall be defined as set forth in Section 18.09.040B, except that cluster open space shall not include land developed under the GC Golf Course Zone. Residential gross density shall conform with the following:
 - Minimum - (none)
 - Maximum - 0.3 RAC

4. Existing Conditions Surrounding Park

4.6 Area Roadway Network:

There is a fully developed roadway network that provides access to Tucson Mountain Park. Interstate 10 is approximately 4 miles east of the park. Interstate 19 is approximately 2 miles east of the southeast corner of the park. These highways provide access to Tucson Mountain Park for visitors from throughout the region. (See Figure 4-E).

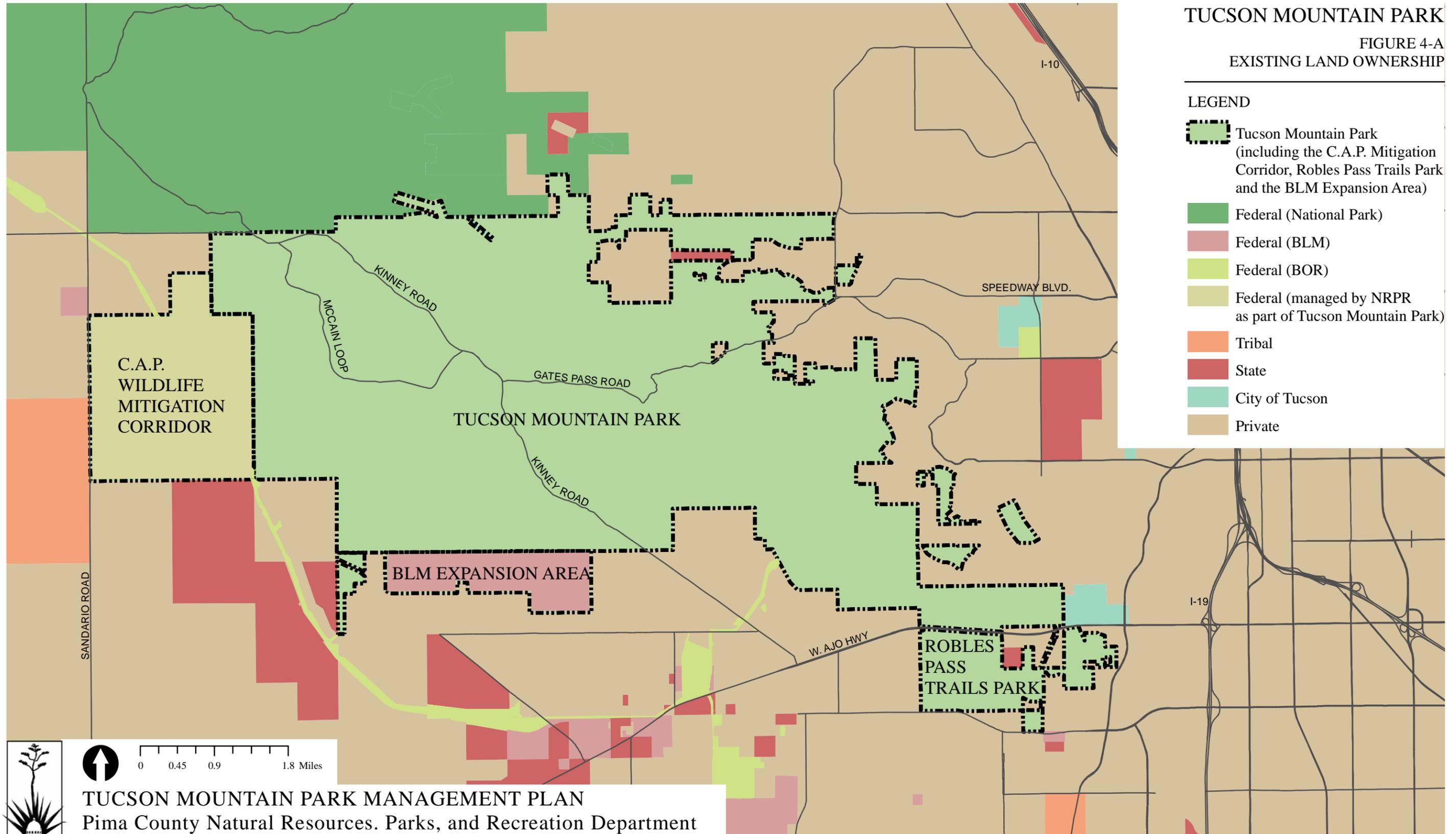
State Highway 86, or the Ajo Highway, passes through the Park between the main portion of the park and the Robles Pass Trails Park. The Arizona Department of Transportation (ADOT) anticipates an increased volume of traffic on this highway as the result of growth in southwest Pima County. Improvements to State Route 86, as needed to accommodate the additional volume of traffic, are planned.

A well developed network of local streets provides access to the boundary of Tucson Mountain Park. These local streets provide access to the existing trailheads at Camino de Oeste, Starr Pass, 36th Street, Kennedy Park, Tucson Estates, and Mile Wide Road. The network of local streets also provides access to the perimeter of the Park as occasionally needed for emergency response.

Within the park there are three public roadways, Gate Pass Road, Kinney Road, and McCain Loop Road. These roads provide access to the developed public use facilities within Tucson Mountain Park. They are also used extensively for travel, that is not related to Tucson Mountain Park. Additional information related to the condition of these roadways, traffic volumes, and other issues associated with the park roadway system is included in Part 15 of this report.

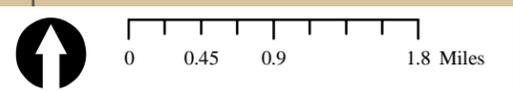
TUCSON MOUNTAIN PARK

FIGURE 4-A
EXISTING LAND OWNERSHIP



LEGEND

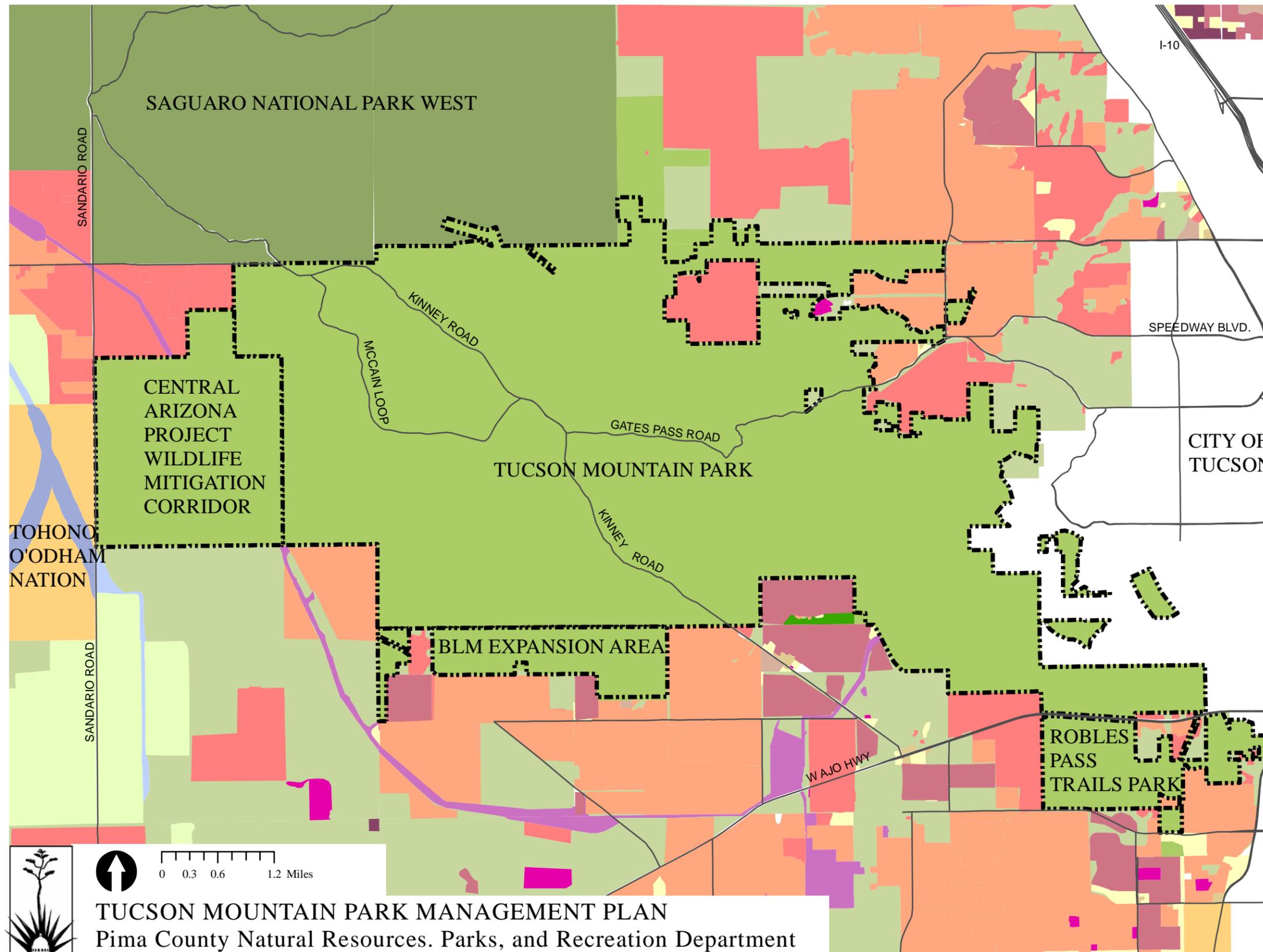
- Tucson Mountain Park (including the C.A.P. Mitigation Corridor, Robles Pass Trails Park and the BLM Expansion Area)
- Federal (National Park)
- Federal (BLM)
- Federal (BOR)
- Federal (managed by NRPR as part of Tucson Mountain Park)
- Tribal
- State
- City of Tucson
- Private



TUCSON MOUNTAIN PARK MANAGEMENT PLAN
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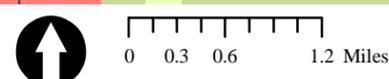
TUCSON MOUNTAIN PARK

FIGURE 4-B
EXISTING LAND USE



LEGEND

- Tucson Mountain Park (including the C.A.P. Mitigation Corridor, Robles Pass Trails Park and BLM Expansion Area)
- Agricultural Land Out of Production
- Central Arizona Project
- Commercial
- Golf Course
- Industrial
- Institutional
- Very Low Density Residential
- Low Density Residential
- Medium Density Residential
- Medium-High Density Residential
- Open Space
- Open Space, Brawley Wash
- Open Space, Brawley Wash - Tribal Land
- County Park
- Federal Park
- Tribal Lands
- Vacant Property, disturbed



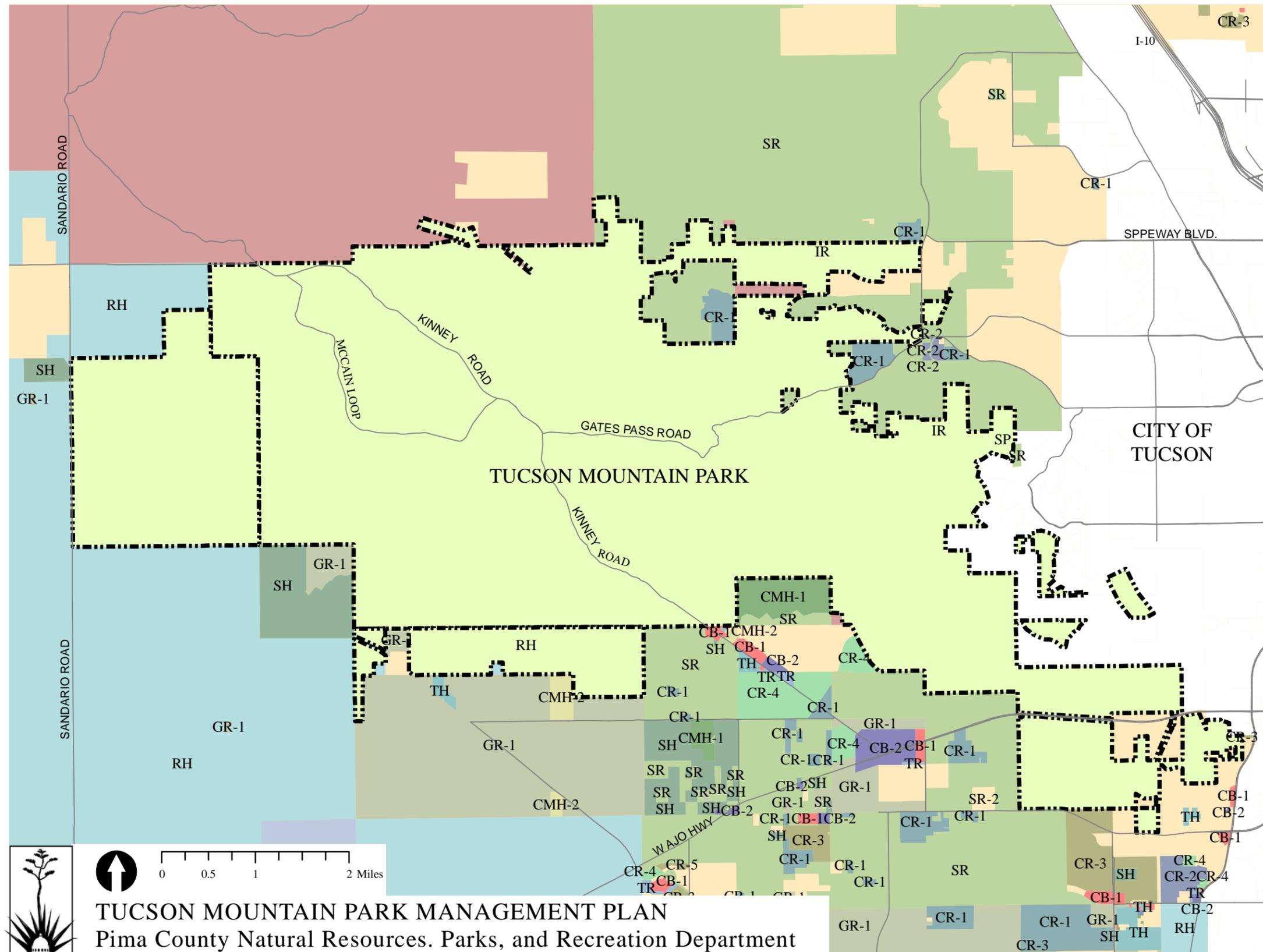
TUCSON MOUNTAIN PARK MANAGEMENT PLAN
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Source: Pima County GIS data layer lu cnt90 (1990)

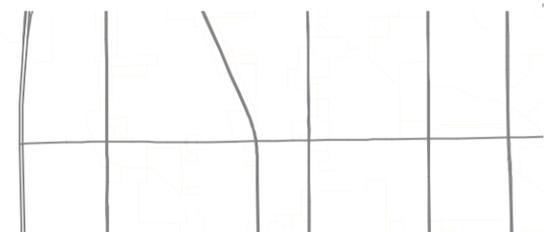
TUCSON MOUNTAIN PARK

FIGURE 4-C
EXISTING ZONING



LEGEND

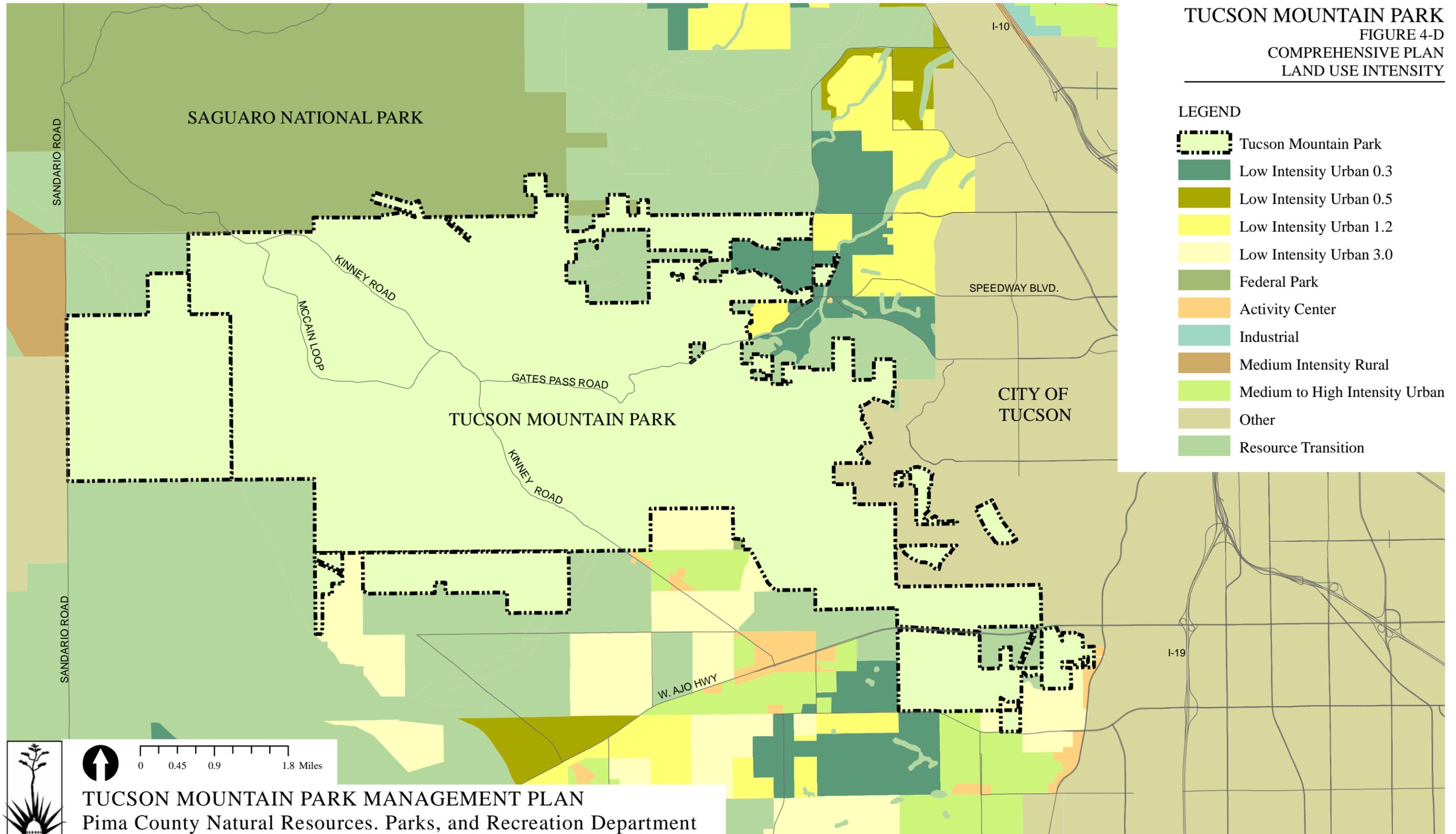
- Tucson Mountain Park
- Unknown
- CB-1 - Local Business
- CB-2 - General Business
- CI-2 - General Industrial
- CMH-1 - County Manufactured and Mobile Home-1
- CMH-2 - County Manufactured and Mobile Home-2
- CR-1 - Single Residence
- CR-2 - Single Residence
- CR-3 - Single Residence
- CR-4 - Mixed Dwelling Type
- GR-1 - Rural Residential
- IR - Institutional Reserve
- RH - Rural Homestead
- SH - Suburban Homestead
- SR - Suburban Ranch
- TH - Trailer Homesite
- TR - Transitional
- City of Tucson
(Zoning Not Shown)



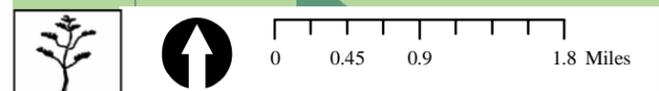
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Pima County Natural Resources, Parks, and Recreation Department

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TUCSON MOUNTAIN PARK
FIGURE 4-D
COMPREHENSIVE PLAN
LAND USE INTENSITY



- LEGEND**
- Tucson Mountain Park
 - Low Intensity Urban 0.3
 - Low Intensity Urban 0.5
 - Low Intensity Urban 1.2
 - Low Intensity Urban 3.0
 - Federal Park
 - Activity Center
 - Industrial
 - Medium Intensity Rural
 - Medium to High Intensity Urban
 - Other
 - Resource Transition



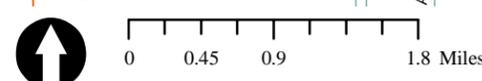
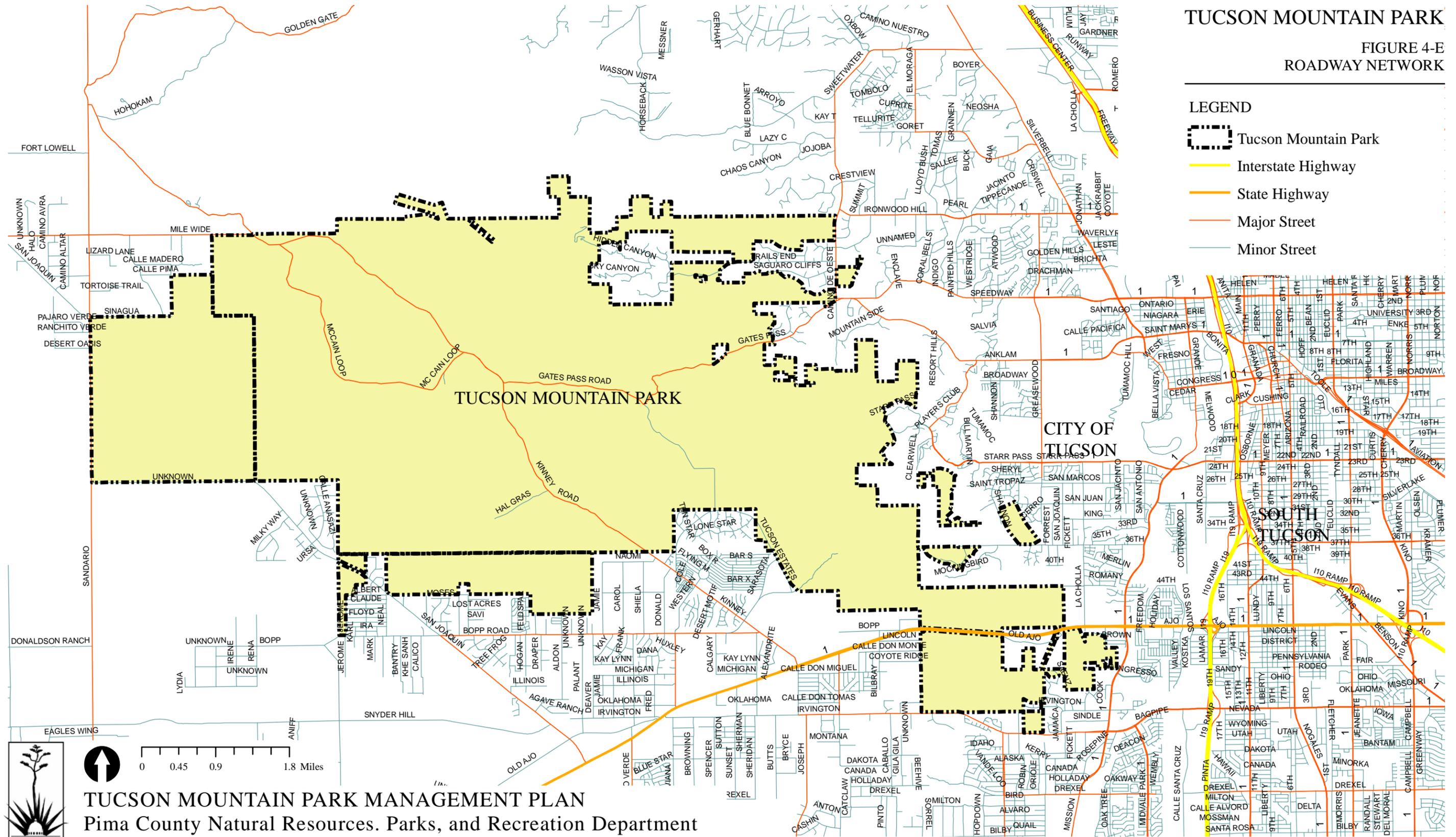
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TUCSON MOUNTAIN PARK

FIGURE 4-E
ROADWAY NETWORK

LEGEND

-  Tucson Mountain Park
-  Interstate Highway
-  State Highway
-  Major Street
-  Minor Street



TUCSON MOUNTAIN PARK MANAGEMENT PLAN
Pima County Natural Resources, Parks, and Recreation Department

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5. Physical Features

5.1 Introduction:

Tucson Mountain Park's physical features are typical of the southern Arizona basin-and-range geomorphology. They include peaks that extend several thousand feet above the surrounding valley floor, rugged and rocky slopes, deep boulder filled canyons, and relatively flat bajadas with deep soils and shallow braided washes. In combination, these physical features define the visual and scenic qualities of the Park. They also create the environmental conditions necessary to support the biotic communities that are present.

There is also an important relationship between the physical resources and the type and intensity of human activities that can be supported. Trails constructed on bedrock may withstand heavy use without degradation while trails built on erodible soils may be incapable of supporting even minor use. As such, it is important to understand the physical resources of the Park so that sound management decisions can be made.

5.2 Topography and Major Landforms:

The Tucson Mountains extend along a northwest to southeast axis a distance of approximately 11 miles. There is a prominent ridgeline with steep slopes that extend down to the Santa Cruz River Valley on the east and the Avra Valley Brawley / Black Wash drainage system on the west. Tucson Mountain Park encompasses the southern end of the range. (See Figure 5-A).

As viewed from the Tucson metropolitan area on the east, the ridgeline of the Tucson Mountains creates a distinct backdrop for the valley below. Prominent peaks as seen from vantage points to the east include Tower Peak (elevation 4,132 Ft.) and Bushmaster Peak (elevation 4,034 Ft.).

As seen from the south, Cat Mountain (elevation 3,773 Ft.) is the most prominent landform. It creates an iconic vista that is often associated with the Tucson Mountains. From the west, Golden Gate Mountain (elevation 4,288 Ft.), Bren Peak (elevation 3,988 Ft.) and Brown Mountain (elevation 3,098 Ft.) are visible as are Tower Peak and Bushmaster Peak.

5.3 Slopes:

As would be expected in a mountain park, there is steep rugged topography throughout much of the park. Approximately 50 percent of the park area, or almost 12,000 acres) exhibit slopes that exceed 15%. (See Figure 5-B). These typically occur in the eastern portion of the park on the eastern and western slopes that extend up to the ridgeline.

These areas are generally unsuitable for roadway or park facility development. Trails can be, and often are, constructed in these steep area but with alignments that utilize switch-backs and other features that flatten the actual slope of the trail.

Slopes in the remaining 50 percent of the park area has slopes that are less than 15%. These flatter areas are generally on the west side of the park as the range extends across a bajada towards Avra Valley and the Brawley Wash. Most of the existing development within the park is in areas with these flatter slopes.

5.4 Geology:

The Tucson Mountains occur within the basin-and-range physiographic province which is characterized by blocks of strata that have been uplifted and tilted along faults to form mountain ranges. The present configuration of the Tucson Mountains is the result of geologic processes dating to Precambrian time, 1.7 billion years ago. The distribution of the major rock units present within and adjacent to the park is illustrated in Figure 5-C. These rock units are described below.

Andesite:

Andesite is an igneous, volcanic rock, of intermediate composition, with aphanitic to porphyritic texture. The mineral assembly is typically dominated by plagioclase plus pyroxene and/or hornblende. Biotite, quartz, magnetite, sphene are common accessory minerals. Alkali feldspar may be present in minor amounts.

Rhyolite:

Rhyolite is an igneous, volcanic (extrusive) rock, of felsic (acidic) composition. It may have any texture from aphanitic to porphyritic. The mineral assemblage is usually quartz, alkali feldspar and plagioclase (in a ratio > 1:2). Biotite and pyroxene are common accessory minerals.

Alluvium:

Alluvium (from the Latin, *alluvius*, from *alluere*, "to wash against") is soil or sediments deposited by a river or other running water. Alluvium is typically made up of a variety of materials, including fine particles of silt and clay and larger particles of sand and gravel. Alluvium often contain valuable ores such as gold and platinum and a wide variety of gemstones.

Intrusive Igneous:

Intrusive igneous rocks (etymology from latin *ignis*, fire) are rocks formed by solidification of cooled magma (molten rock), with or without crystallization, below the surface. This magma can be derived from partial melts of preexisting rocks in either the Earth's mantle or crust.

Limestone/Dolomite:

Dolomite is the name of a sedimentary carbonate rock and a mineral, both composed of calcium magnesium carbonate $\text{CaMg}(\text{CO}_3)_2$ found in crystals. Dolomite rock (also dolostone) is composed predominantly of the mineral dolomite. Limestone that is partially replaced by dolomite is referred to as dolomitic limestone, or in old U.S. geologic literature as *magnesian limestone*.

5.5 Soils:

The distribution of the various soil series that are present within Tucson Mountain Park and in adjacent areas is shown in Figure 5-D. Descriptions of these soil series are as follows:

Anklam - Pantano - Chiminea Soil Series:

The Anklam series consists of shallow, well drained soils that formed in slope alluvium from metamorphic and igneous rock. Anklam soils are on hills, mountains and pediments and have slopes of 5 to 50 percent. The mean annual precipitation in locations where these soils occur is approximately 12 inches and the mean annual air temperature is approximately 65 degrees F.

The Pantano series consists of shallow, well drained soils formed in slope alluvium and colluvium from metamorphic rock and limestone. Pantano soils are on hills, pediments and mountains. Slopes range from 5 to 50 percent. The mean annual precipitation in locations where these soils occur is approximately 11 inches and the mean annual air temperature is approximately 66 degrees F.

The Chimenea series consists of very shallow and shallow, well drained soils formed in material from coarse grained granitic rock. Chimenea soils are on hills and pediments. Slopes range from 5 to 30 percent. The mean annual precipitation in locations where these soils occur is about 11 inches and mean annual temperature is approximately 67 degrees F.

Pinaleno - Nickel - Palos Verdes Soil Series:

The Pinaleno series consists of very deep, well drained soils formed in fan alluvium from mixed rock. Pinaleno soils are on fan terraces and stream terraces. Slopes are 0 to 45 percent. The mean annual precipitation in locations where these soils occur is approximately 10 inches and the mean annual air temperature is approximately 62 degrees F.

The Nickel series consists of very deep, well drained soils that formed in alluvium from mixed rock sources. Nickel soils are on fan remnants. Slope ranges from 0 to 35 percent. The mean annual precipitation in locations where these soils occur is about 5 inches and the mean annual temperature is approximately 65 degrees F.

The Palos Verdes series consists of very deep, well drained soils that formed in fan alluvium from granitic, volcanic and metamorphic rocks. Palos Verdes soils are on relict fan terraces and have slopes of 2 to 15 percent. The mean annual precipitation in locations where these soils occur is approximately 11 inches and the mean annual air temperature is approximately 67 degrees F.

Continental -Tubac Soil Series:

The Continental series consists of very deep, well drained soils formed in alluvium from mixed sources. Continental soils are on fan terraces and have slopes of 0 to 15 percent. The mean annual precipitation in locations where these soils occur is approximately 10 inches and the mean annual temperature is approximately 65 degrees F.

The Tubac series consist of very deep, well drained soils that formed in alluvium from mixed sources. Tubac soils are on fan terraces and basin floors and have slopes of 0 to 8 percent. The mean annual precipitation in locations where these soils occur is about 10 inches and the mean annual air temperature is approximately 65 degrees F.

Mohave - Sahuarita - Cave Soil Series:

The Mohave series consists of very deep, well drained soils formed in mixed alluvium. Mohave soils are on fan terraces, basin floors, and stream terraces and have slopes of 0 to 8 percent. The mean annual precipitation in locations where these soils occur is approximately 10 inches and the mean annual air temperature is approximately 63 degrees F.

The Sahuarita series consists of very deep, well drained soils formed in alluvium from limestone, schist, phyllite and granitic rock. Sahuarita soils are on fan terraces and basin floors have slopes of 0 to 8 percent. Mean annual precipitation in locations where these soils occur is approximately 11 inches and the mean annual air temperature is approximately 68 degrees F.

The Cave series consists of very shallow and shallow to a hardpan, well drained soils formed in mixed alluvium. Cave soils are on fan terraces, fan piedmonts and stream terraces and have slopes of 0 to 35 percent. The mean annual precipitation in locations where these soils occur is approximately 8 inches and the mean annual air temperature is approximately 63 degrees F.

Tanque - Riveroad - Arizo - Riggs Soil Series:

The Riveroad series consists of very deep, well drained soils formed in stream alluvium from mixed sources. Riveroad soils are on flood plains and alluvial fans and have slopes of 0 to 5 percent. The mean annual precipitation in locations where these soils occur is approximately 14 inches and the mean annual air temperature is approximately 65 degrees F.

The Arizo series consists of very deep, excessively drained soils that formed in mixed alluvium. Arizo soils are on recent alluvial fans, inset fans, fan apron, fan skirts, stream terraces, floodplains of intermittent streams and channels. Slope ranges from 0 to 15 percent. The mean annual precipitation in locations where

these soils occur is approximately 7 inches and the mean annual temperature is approximately 62 degrees F.

The Riggs series consists of very deep, moderately well drained soils formed in stream or fan alluvium from volcanic, granitic and sedimentary rock. Riggs soils are on flood plains and alluvial fans and have slopes of 0 to 2 percent. The average annual precipitation in locations where these soils occur is approximately 13 inches and the mean annual temperature is approximately 61 degrees F.

5.6 Washes and Drainageways:

The ridgeline of the Tucson Mountain Park forms a divide between the Santa Cruz River watershed to the east and the Black / Brawley Wash watershed to the west. Because these drainageways are in close proximity to Tucson Mountain Park, the size of the sub-basins within the park tend to be relatively small. There are, however, several major washes and numerous small washes that extend through the Park. (See Figure 5-E).

Principal washes that headwater in Tucson Mountain Park and drain towards the Santa Cruz River include the Sweetwater, Roger, Trails End, Speedway, Painted Hills, Anklam, Cholla, and Dakota Washes. Numerous tributary washes are also present.

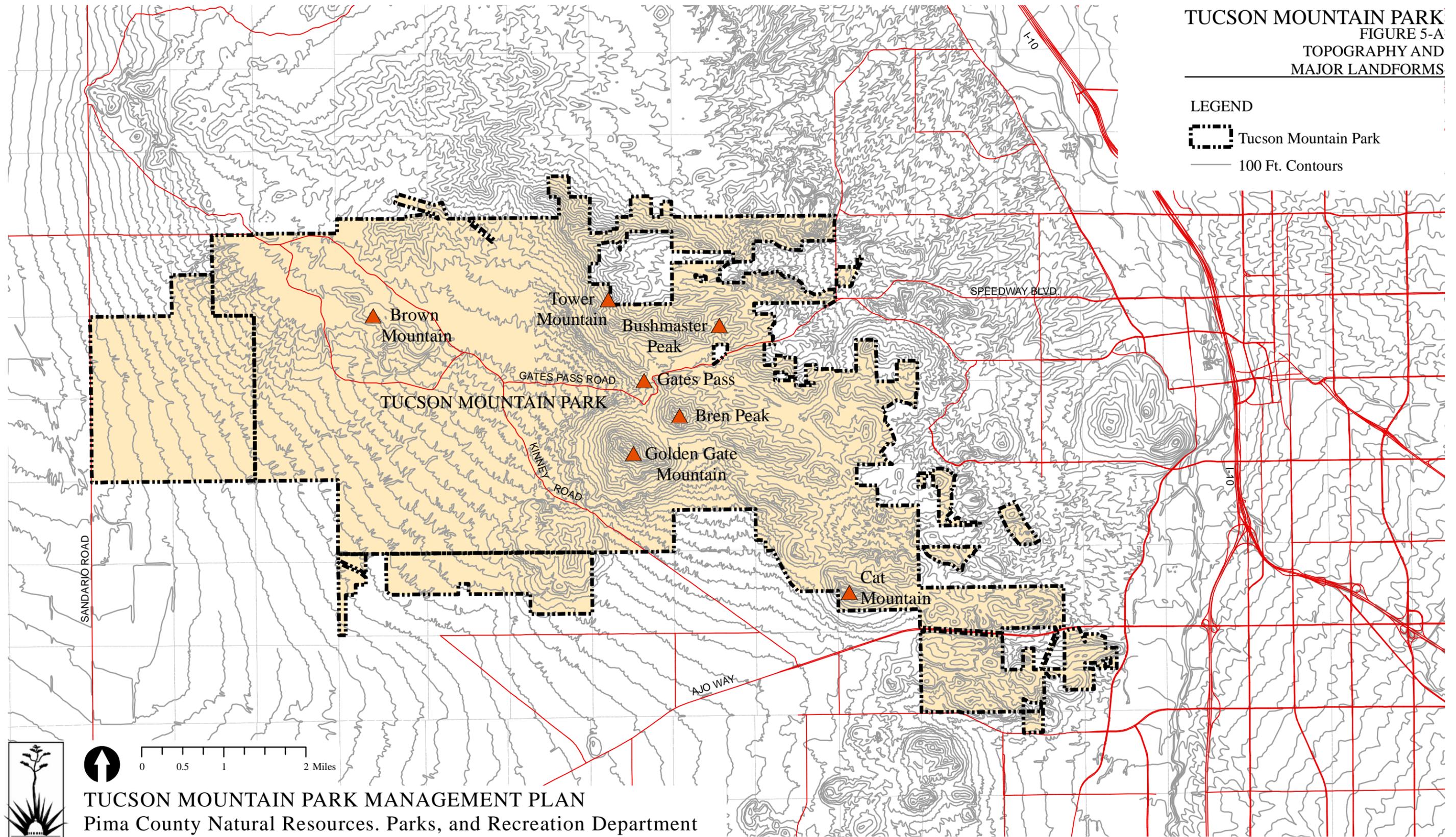
There are also many small washes that drain from the northeast to the southwest across the park from the ridgeline of the Tucson Mountains to the Black Wash and Brawley Wash. These are typically unnamed washes. (See Figure 5-E). Many of these washes cross Kinney Road in piped culverts or as dip crossings. Though flows can be substantial during and immediately following storms, these flows generally dissipate quickly due to the relatively small upstream watershed.

There is limited data related to storm flows in wash segments within Tucson Mountain Park. This is due to the absence of recent development project that would have necessitated the modeling of the hydraulic characteristics of these washes and the calculation of storm-flows.

TUCSON MOUNTAIN PARK
 FIGURE 5-A
 TOPOGRAPHY AND
 MAJOR LANDFORMS

LEGEND

-  Tucson Mountain Park
-  100 Ft. Contours

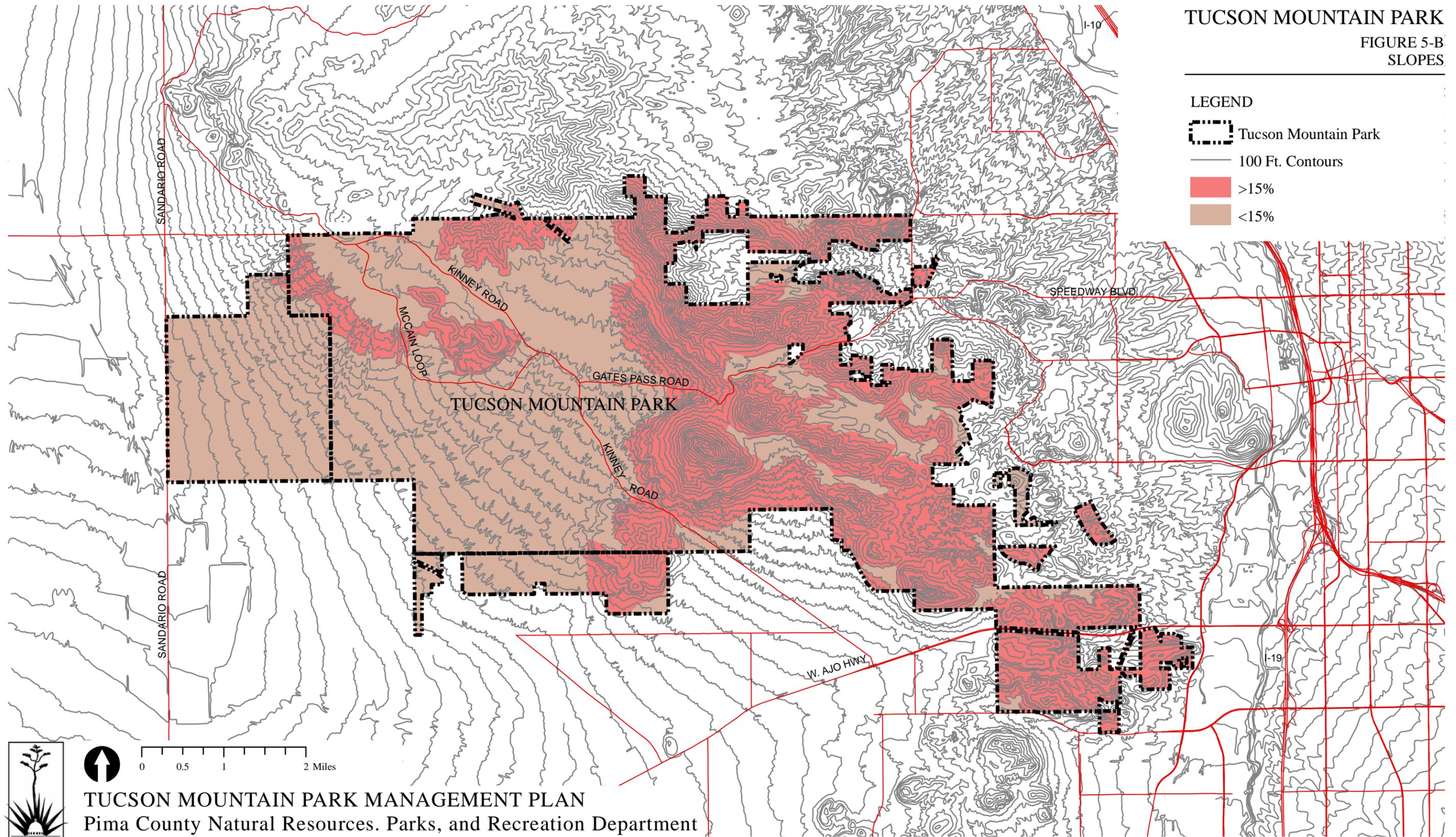


0 0.5 1 2 Miles

TUCSON MOUNTAIN PARK MANAGEMENT PLAN
 Pima County Natural Resources, Parks, and Recreation Department

Prepared by McGann & Associates Landscape Architects and Planners

TUCSON MOUNTAIN PARK
FIGURE 5-B
SLOPES



LEGEND

-  Tucson Mountain Park
-  100 Ft. Contours
-  >15%
-  <15%



0 0.5 1 2 Miles

TUCSON MOUNTAIN PARK MANAGEMENT PLAN
 Pima County Natural Resources, Parks, and Recreation Department

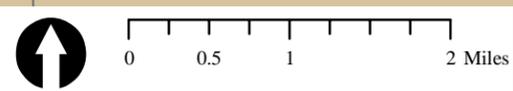
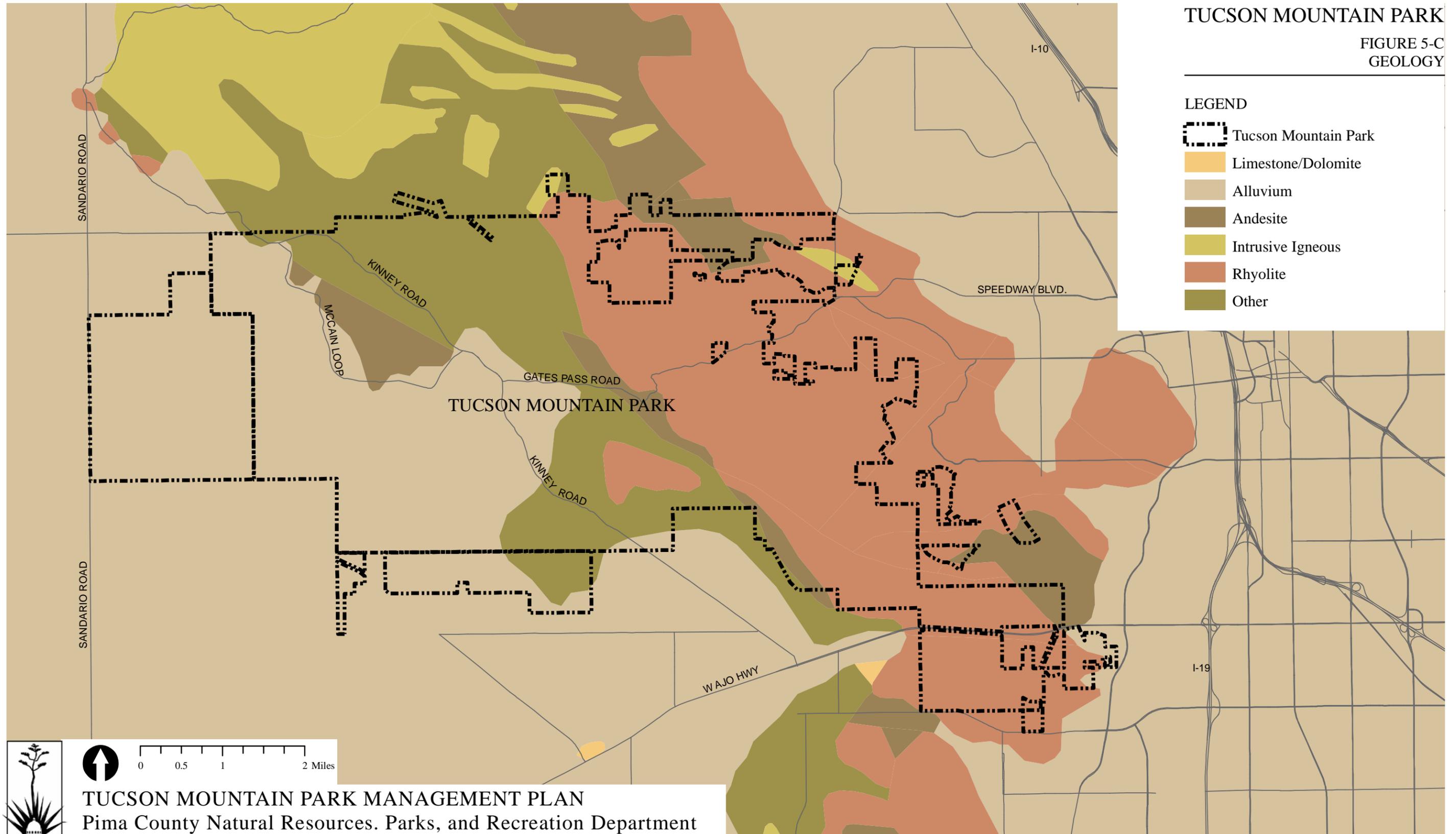
Prepared by McGann & Associates Landscape Architects and Planners

TUCSON MOUNTAIN PARK

FIGURE 5-C
GEOLOGY

LEGEND

-  Tucson Mountain Park
-  Limestone/Dolomite
-  Alluvium
-  Andesite
-  Intrusive Igneous
-  Rhyolite
-  Other



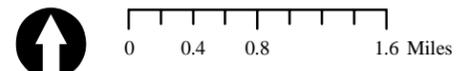
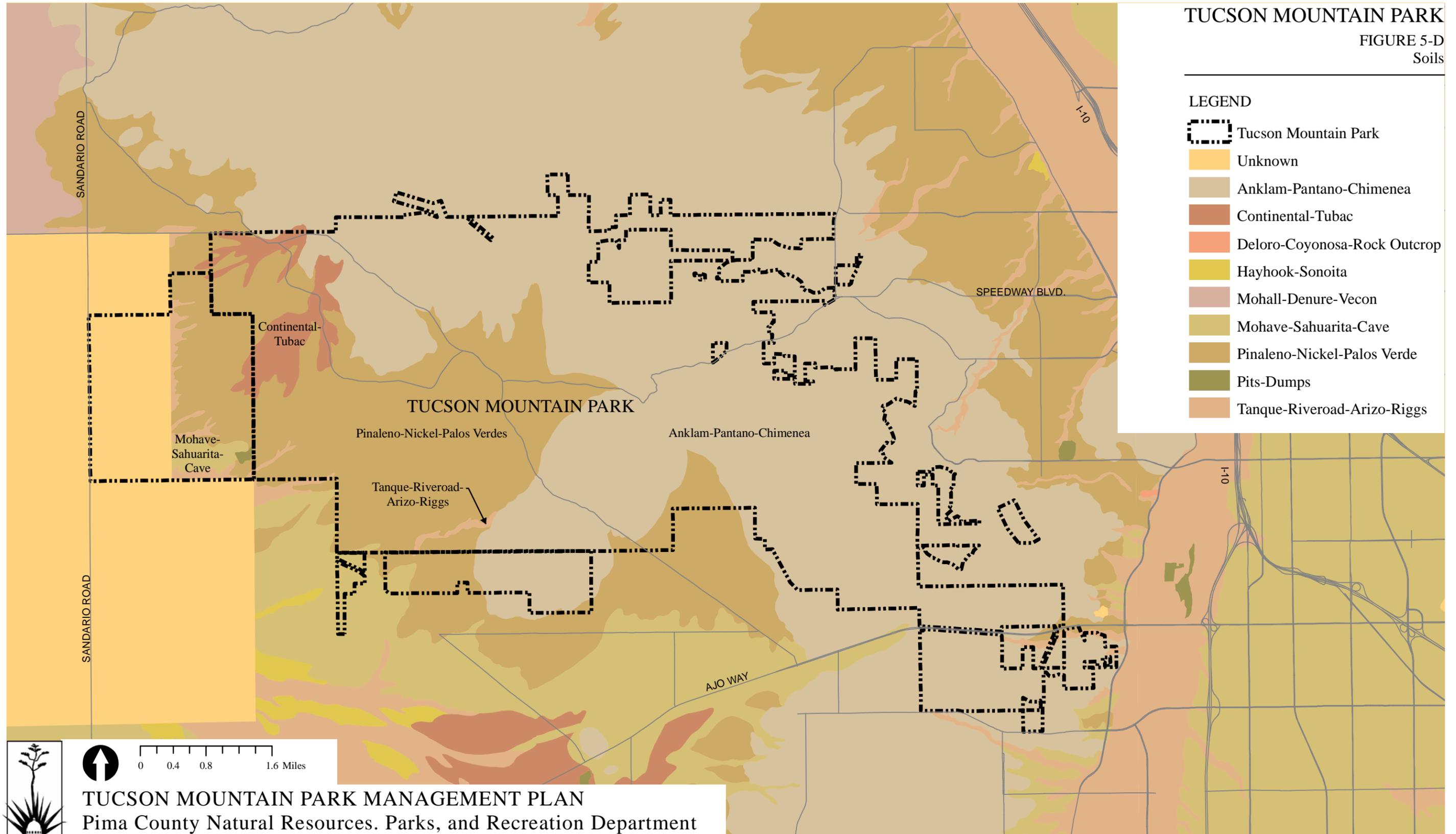
TUCSON MOUNTAIN PARK MANAGEMENT PLAN
Pima County Natural Resources, Parks, and Recreation Department
Prepared by McGann & Associates Landscape Architects and Planners

TUCSON MOUNTAIN PARK

FIGURE 5-D
Soils

LEGEND

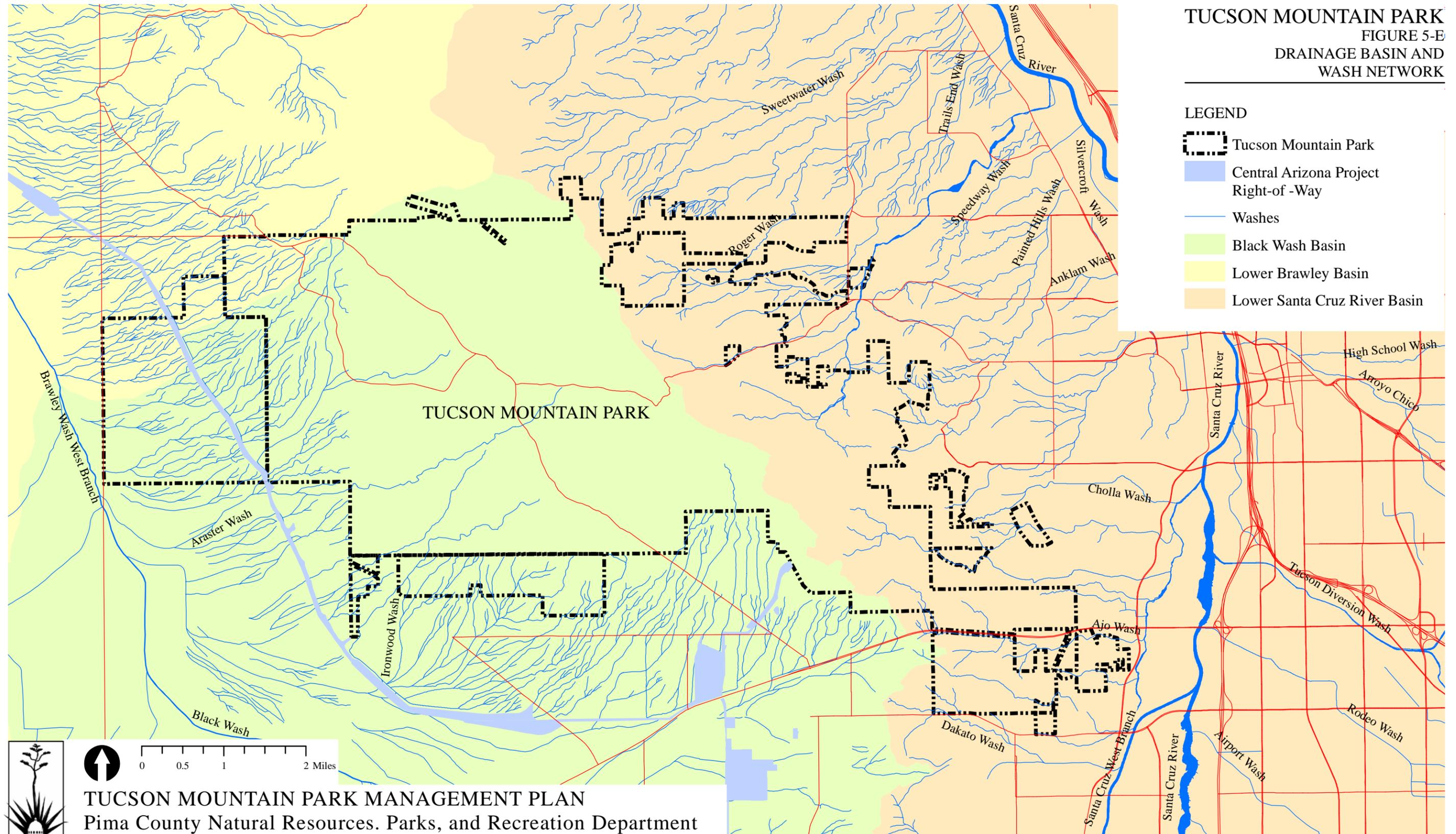
-  Tucson Mountain Park
-  Unknown
-  Anklam-Pantano-Chimenea
-  Continental-Tubac
-  Deloro-Coyonosa-Rock Outcrop
-  Hayhook-Sonoita
-  Mohall-Denure-Vecon
-  Mohave-Sahuarita-Cave
-  Pinaleno-Nickel-Palos Verde
-  Pits-Dumps
-  Tanque-Riveroad-Arizo-Riggs



TUCSON MOUNTAIN PARK MANAGEMENT PLAN
Pima County Natural Resources, Parks, and Recreation Department

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TUCSON MOUNTAIN PARK
FIGURE 5-E
DRAINAGE BASIN AND
WASH NETWORK



LEGEND

-  Tucson Mountain Park
-  Central Arizona Project Right-of-Way
-  Washes
-  Black Wash Basin
-  Lower Brawley Basin
-  Lower Santa Cruz River Basin

 0 0.5 1 2 Miles

 **TUCSON MOUNTAIN PARK MANAGEMENT PLAN**
Pima County Natural Resources, Parks, and Recreation Department
Prepared by McGann & Associates Landscape Architects and Planners

6. Biological Resources - Vegetation

6.1 Introduction

The Tucson Mountains are an arid mountain range with vegetation characteristic of the Sonoran Desert. Within Tucson Mountain Park, the elevation ranges from 2,280 feet [ft] (695 meters [m]) on the western basin floor to 4,288 ft (1,300 m) on Golden Gate Mountain. The vegetation communities shift in an elevational gradient from creosote flats on the basin floor to bajadas and slopes of paloverde and saguaro cactus to ridges that support some small patches of grasslands.

6.2 Vegetative Communities

There are many vegetation classification frameworks that have been applied to Tucson Mountain Park; this discussion uses the framework set forth by Brown, ed (1994), and the numbers preceding the following descriptions refer to that system. With this numerical identification system, the significance of each digit, starting from the left, is as follows:

First Digit (Vegetation Type): This digit refers to the general type of vegetation. A (1) in this location refers to Upland Vegetation. A (2) in this location refers to Wetland Vegetation. Both Upland and Wetland Vegetation are present within the park.

Second Digit (Formation): This digit refers to the type of biological community or formation. Formations within Upland Vegetation include: (4) - Grassland and (5) - Desertland. Formations within Wetland Vegetation include (3) Riparian Scrub.

Third Digit (Climate): This digit refers to one of the four climatic zones. These zones are distinguished, in part, by the potential for freezing temperatures. Examples include: (3) - Warm Temperate Zone and (4) - Tropical / Subtropical Zone.

Fourth Digit (Biome): This digit (the first digit to the right of the decimal) refers to the major biological community or biome. Biome types found in the park include (1) - Semi-desert Grassland and (7) - Sonoran Scrubland.

Fifth Digit (Community / Series): This digit, the second to the right of the decimal, refers to the principal plant community or Series, within the biome as distinguished by dominant plant species. An examples of Series found within the park is the *Prosopis velutina* - Mixed Scrub Series.

Sixth Digit (Association): This digit, the third to the right of the decimal, refers to distinctive plant Associations within the Series. Examples of Associations found within the park include the *Olneya tesota* - Mixed Scrub Association and the *Simmondsia chinensis* Mixed Scrub Association.

6. Biological Resources - Vegetation

The following plant communities are present in Tucson Mountain Park (Figure 6-F):

143.1 Semidesert grassland. This vegetation community is patchily distributed at the highest elevations at Tucson Mountain Park and occupies approximately 2 percent of the park (215 acres [87 ha]). Representative species include several grasses such as Arizona cottontop (*Digitaria californica*), green sprangletop (*Leptochloa dubia*), plains lovegrass (*Eragrostis intermedia*), grama grasses (*Bouteloua* spp.), tanglehead (*Heteropogon contortus*). Velvet mesquite (*Prosopis velutina*), whitethorn acacia (*Acacia constricta*) and catclaw acacia (*A. greggii*), banana yucca (*Yucca baccata*) are present in the overstory, and common plants of the understory include shin daggers (*Agave schottii*), sotol (*Dasyilirion wheeleri*), turpentine bush (*Ericameria laricifolia*), and buckwheats (*Eriogonum* spp.), prickly pear (*Opuntia* spp.), chollas (*Cylindropuntia* spp.), and fishhook barrel cactus (*Ferocactus wislizenii*) in addition to the grasses.

Priority Vulnerable Species that may occur at Tucson Mountain Park within this vegetation community include lesser long-nosed bat and Swainson's hawk.

143.141 Sacaton – scrub series (*Sporobolus wrightii* association). This vegetation community has a very limited distribution at Tucson Mountain Park, occurring only on less than one acre (0.4 ha) the San Juan Wash drainage, downstream of a CCC dam near the Park boundary at the end of Mockingbird Lane (Figure 6-A and 6-F). Native vegetation includes sacaton (*Sporobolus wrightii*), seep willow (*Baccharis salicifolia*), desert broom (*Baccharis sarothroides*), graythorn (*Zizyphus obtusifolia*), white-thorn acacia, catclaw acacia, velvet mesquite, and blue paloverde (*Parkinsonia florida*). At this particular location, there are also a variety of non-native, invasive species that dominate the area, including: Johnson grass (*Sorghum halapense*), Bermuda grass (*Cynodon dactylon*), Russian thistle (*Salsola* sp.), fountain grass (*Pennisetum setaceum*), and rabbitfoot grass (*Polypogon monspeliensis*).

The Tucson Mountains have very few areas that retain water, and this area is a unique wildlife resource, making it an excellent restoration candidate. The area is in close proximity to many features that may encourage recreational impacts: the Park boundary, the Yetman Trail, and residential areas.

6. Biological Resources - Vegetation



Figure 6-A Sacaton-scrub series (*Sporobolus wrightii* association) at San Juan Wash.

154.11 Creosotebush – bursage series (“Lower Colorado River Series”).

This vegetation community occurs on nearly 3 percent of the park (approximately 275 acres [111 ha]), between 2,130 – 2,625 ft (650 – 800 m) in elevation on fine-grained soils of mostly flat terrain at the western and southwestern boundaries (Figure 6-B and 6-F). Structural diversity is low compared to the other vegetation communities; creosote (*Larrea tridentata*) and triangle-leaf bursage (*Ambrosia deltoidea*) are the dominant species. Other common species include white bursage (*Ambrosia dumosa*), desert zinnia (*Zinnia acerosa*), saltbush (*Atriplex* spp.), fishhook barrel cactus, and chollas.



Figure 6-B Creosotebush – bursage series (“Lower Colorado River Series”) at the southern boundary of TMP.

6. Biological Resources - Vegetation

This vegetation community occurs on the west side of the Park, especially in the area of the Central Arizona Project (CAP). Populations of Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*), an endangered plant and Priority Vulnerable Species, are known from this vegetation community in close proximity to the western boundary of the Park.

154.12 Paloverde-mixed cacti (“Arizona Upland”). This is the most widespread vegetation community of Tucson Mountain Park, comprising nearly 90 percent of the park (approximately 8,300 acres [3360 ha]). It is the community that exemplifies the Sonoran Desert to many people (Figure 6-C and 6-F). It has a very high biodiversity and reaches its best development on the well-drained soils of rocky slopes and mid to upper bajadas. The overstory of this community includes foothills paloverde (*Parkinsonia microphylla*), blue paloverde, velvet mesquite, ironwood (*Olneya tesota*), ocotillo (*Fouquieria splendens*), and saguaro (*Carnegiea gigantea*). Common components of the understory include jojoba (*Simmondsia chinensis*), triangle-leaf bursage, brittlebush (*Encelia farinosa*), paperflower (*Psilostrophe cooperi*), janusia (*Janusia gracilis*), range ratany (*Krameria parviflora*), prickly pears, chollas, hedgehog cactus (*Echinocereus fendleri*), pincushion cactus (*Mammillaria* spp.), and a wide variety of grasses and annuals.



Figure 6-C Paloverde-mixed cacti (“Arizona Upland”).

This community provides habitat for a variety of Priority Vulnerable Species that may occur at TMP, including the cactus ferruginous pygmy-owl, rufous-winged sparrow, and lesser long-nosed bat, and Sonoran Desert tortoise. Recent

6. Biological Resources - Vegetation

invasion of both perennial African grasses (such as buffelgrass [*Pennisetum ciliare*] and fountain grass [*P. setaceum*]) and annual grass species (such as red brome [*Bromus rubens*]) are threatening this vegetation community through changes to fire extent, frequency, and intensity.

154.123 *Simmondsia chinensis* - mixed scrub association. Within the paloverde – mixed cactus series, there are pure stands of jojoba on rocky north slopes above 2,625 ft (800 m) (Rondeau et al. 1996). This community reaches its best development in the upper middle portions of the range on higher east and north-facing slopes, especially from Gates Pass Road near Las Lomas. Due to their patchy distribution and the scale of this review, these areas were not surveyed or mapped for this report.

154.127 Mixed shrub – *Parkinsonia microphylla* – *Olneya tesota* – mixed scrub association. Within the paloverde–mixed cacti matrix, there are stands of ironwood trees. These occur on alluvial soils of gentle bajadas at 2,130 – 2,950 ft (650 – 900 m) in elevation on the western slopes of the Tucson Mountains (Rondeau et al. 1996). They comprise approximately 350 acres (142 ha) of the Arizona upland. This community is conspicuous north of the intersection of Kinney Road and Gates Pass Road. Ironwood stands are identified as a “special element” in Pima County’s Sonoran Desert Conservation Plan (SDCP).

234.712 Sonoran riparian scrubland, *Prosopis velutina*-mixed scrub series. This vegetation community occurs along canyons and washes, creating ribbons of relatively dense and lush vegetation, usually with more structural diversity than the surrounding uplands. Using Pima County GIS layers and aerial photography, the extent of this vegetation community is estimated to cover over 7 percent (684 acres [277 ha]) of the park. The overstory trees are commonly velvet mesquite and blue paloverde, and the dense shrub layer can include wolfberry (*Lycium* spp.), desert hackberry (*Celtis pallida*), graythorn, catclaw acacia, white-thorn acacia, desert lavender (*Hyptis emoryi*), baby bonnets (*Coursetia glandulosa*), and canyon ragweed (*Ambrosia ambrosioides*). The linear nature of this vegetation community generally lends to its high value for wildlife movement between highlands and lowlands. In addition, the species diversity and well-developed vegetation structure (i.e., tree layer, shrub layer, sub-shrub layer, annual layer) provide a wealth of cover and food resources.

6. Biological Resources - Vegetation

6.3 Pima County Priority Vulnerable Species

The table below identifies plant species included on the Pima County Priority Vulnerable Species List. This table indicates the likelihood of these species being present within Tucson Mountain Park.

Name	Habitat Description	Potential to Occur in TMP
<i>Coryphantha scherri</i> var. <i>robustipina</i> Pima pineapple cactus	Ridges in semidesert grassland and alluvial fans in Sonoran desert scrub (AFGD) 2001).	Possible. Not known from TMP, however, there is a moderate possibility that the southernmost creosote flats near Ajo Highway could be occupied habitat.
<i>Dalea tentaculoides</i> Gentry indigobush	Oak-Juniper woodland and Madrean Evergreen Woodland (AFGD 2001).	Unlikely. TMP is outside the current range of this species (AFGD 2001) and it was not recorded from the Tucson Mountains (Rondeau et al. 1996)
<i>Echinocactus horizonthalonius</i> var. <i>nicholii</i> Nichol Turk's head cactus	Unshaded microsites in Sonoran Desert scrub on dissected alluvial fans at the foot of limestone mountains and on inclined terraces and saddles on limestone mountain sides (USFWS 2006).	Unlikely. TMP is outside the range of this species (AGFD 2004) and it was not recorded from the Tucson Mountains (Rondeau et al. 1996).
<i>Echinomastus erectocentrus</i> var. <i>acunensis</i> Acuna cactus	Well-drained knolls and gravel ridges in Sonoran desertscrub (USFWS 2006).	Unlikely. TMP is outside the range of this species (AGFD 2004) and it was not recorded from the Tucson Mountains (Rondeau et al. 1996).
<i>Echinomastus erectocentrus</i> var. <i>erectocentrus</i> needle-spined pineapple cactus	Found it light-colored gravel on gentle slopes, hills and alluvial fans in upland desert or semi-desert grassland (AGFD 2003).	Unlikely. TMP is outside the range of this species (AGFD 2003) and it was not recorded from the Tucson Mountains (Rondeau et al. 1996).
<i>Lilaeopsis schaffneriana</i> <i>ssp. recurva</i> Huachuca water umbel	Cienegas, perennial low gradient streams, wetlands (USFWS 2006).	Unlikely. TMP lacks water bodies.
<i>Tumamoca macdougalii</i> Tumamoc globeberry	This species occurs in xeric situations, in the shade of a variety of nurse plants along gullies and sandy washes of hills and valleys in Sonoran desertscrub (AGFD 2004)	Likely to occur at TMP; this plant has been recorded from the Tucson Mountains (Rondeau et al. 1996)

6. Biological Resources - Vegetation

6.4 AGFD Heritage Data Management System Records Search:

A review of the Arizona Game and Fish Department's Heritage Data Management System (HMDS) was conducted using the Department's On-Line Environmental Review Tool program. This program identifies special status species that could potentially be found within or near Tucson Mountain Park.

More specifically, this program identifies U.S. Fish and Wildlife Service (ESA) federally listed species, U.S. Bureau of Land Management (BLM) and U.S. Forest Service (USFS) sensitive species, and Arizona Game and Fish Department (AGFD) recognized species of concern. The results of this search are as follows:

Name	Common Name	ESA	USFS	BLM	AGFD
<i>Abutilon parishii</i>	Pima Indian Mallow	SC	S	S	SR
<i>Boerhavia megaptera</i>	Tucson Mountain Spiderling		S		
<i>Coryphantha scheeri</i> <i>var. robustispina</i>	Pima Pineapple Cactus	LE			HS
<i>Desmanthus covillei</i>	Coville Bundleflower		S		
<i>Euphorbia gracillima</i>	Mexican Broomspurge		S		
<i>Hermannia pauciflora</i>	Sparseleaf Hermannia		S		
<i>Mammillaria thornberi</i>	Thornber Fishhook Cactus				SR
<i>Opuntia versicolor</i>	Stag-horn Cholla				SR
<i>Opuntia x kelvinensis</i>	Kelvin Cholla				SR
<i>Tumamoc macdougalii</i>	Tumamoc Globeberry		S	S	SR

HS = Highly Safeguarded
 LE = Listed / Endangered
 S = Sensitive
 SC = Species of Concern
 SR = Salvage Restricted

6. Biological Resources - Vegetation

6.5 Special Status Species Known or Likely to Occur within the Park:

Three plant species are known to occur, or are likely to occur, within Tucson Mountain Park. A description of each of these species is provided below.

PIMA PINEAPPLE CACTUS: *Listed Endangered, Pima County Priority Vulnerable Species, Arizona Department of Agriculture Highly Safeguarded*

USFWS listed this cactus as endangered throughout its range in 1993 (USFWS 1993). Population densities vary throughout its range and it is known to occur south of Tucson, in Pima and Santa Cruz counties, Arizona and in adjacent northern Sonora, Mexico. It is distributed at low densities within the Altar and Santa Cruz Valleys, as well as in low lying areas connecting these valleys. Continued urbanization, farm and crop development, mine expansion, and invasion of non-native species are primary threats to Pima pineapple cactus populations. Overgrazing by livestock, illegal plant collection, and fire-related interactions involving non-native Lehmann's lovegrass also may have negative impacts on the Pima pineapple cactus (AGFD 2001).

This cactus is generally found in open patches within semidesert grassland and Sonoran desertscrub plant communities, especially on flat alluvial bajadas that are comprised of granitic material and within the ecotone between the grassland and desertscrub biomes (Roller 1996). Typically, this cactus is not found in washes or riparian areas.

PIMA INDIAN MALLOW: *ESA Species of Concern, US Forest Service Sensitive, Bureau of Land Management Sensitive, Arizona Department of Agriculture Salvage Restricted*

Pima Indian mallow occurs between 3,000 to about 4,000 ft (915 – 1,220 m) in mesic situations in full sun within higher elevation Sonoran desertscrub, transition zone of upper Sonoran grassland communities, and Sonoran deciduous riparian forest to Arizona upland desertscrub. It is found on rocky hillsides, cliff bases, lower side slopes and ledges of canyons among rocks and boulders. It can be found on slopes in excess of 45 degrees. In riparian areas, this plant occurs on flat secondary terraces but typically not in canyon bottoms. Often found near trails, probably because of the influence of the trail on localized changes in light, heat, and water. Pima Indian Mallow is considered sensitive by both the US Forest Service and the Bureau of Land Management, and it is salvage restricted by the Arizona Department of Agriculture. This species is known to occur at some upper elevation areas within Tucson Mountain Park.

TUMAMOC GLOBEBERRY: *Pima County Priority Vulnerable Species*

Formerly a federally listed endangered species under the Endangered Species Act, the Tumamoc globeberry was removed from the list on 18 June 1993, largely because increased survey effort showed that this cryptic species was more common than previously thought (USFWS 1993). The Tumamoc globeberry is a

6. Biological Resources - Vegetation

perennial vine found in xeric but shady conditions throughout desert areas in southern Arizona and Sonora, Mexico (AGFD 2004). In Arizona, the plant occurs in Maricopa, Pinal, and Pima counties below 3,000 ft (915 m), in the shade of nurse plants along gullies and sandy washes (Reichenbacher and Associates 1990).

Soil requirements range from sandy soils of valley bottoms to rocky soils of upper bajada slopes (Reichenbacher and Associates 1990). The species is dormant during winter and early spring. Above ground growth occurs after summer rains with fruits appearing in August and September.

In the Tucson area, urbanization and agricultural development in the Avra Valley have modified much of the former range of this plant (AGFD 2004). Other threats include overgrazing, recreation, habitat conversion, predation of tubers by javelina, off-road vehicle use, and pesticides (AGFD 2004).

The species is known to occur in TMP, and over 400 plants were transplanted to a *Tumamoca* preserve during construction of the CAP Aqueduct (AGFD 2004).

6.6 Threats and Stressors to Vegetation Communities

Invasive Species

Invasive plant species can have a variety of negative impacts on native vegetation resources, including: crowding, competition for water resources, and encouraging fire. These impacts generally culminate in decreased biodiversity, decreased habitat value for native wildlife, and a noticeable change in the visual character of the desert. Roads may be the first point of entry for exotic species into a new landscape, and the road can serve as a corridor along which plants move farther into the landscape (Greenberg et al. 1997, Lonsdale and Lane 1994).

Effective invasive species management is consistent with the goals and objectives set forth by the SDCP, and its importance has been highlighted by many associated reports (e.g., Huckelberry 2002, Kingsley 2000, Connolly 2000). In addition, in October 2005 the Pima County Board of Supervisors adopted Resolution 2005-265, regarding the management of invasive species in the county. This issue is considered by many to be the most serious challenge facing resource managers in the Sonoran Desert, and Pima County has been proactively addressing this issue. Saguaro National Park, with over 24,000 acres (9,700 ha) of land adjacent to Tucson Mountain Park, has implemented an adaptive exotic plant management plan (NPS 2004) with the goals of:

1. Preventing new exotic species from becoming established,
2. Immediately treating any new infestations of the 13 species previously found in and currently eradicated from the park,
3. Eradicating 17 species which are the most invasive and pose the greatest threat to the biological diversity within the park, and
4. Eradicate, contain, or control the spread of 63 known invasive species in future years as time, funding, and scientific knowledge allow.

6. Biological Resources - Vegetation

The table below contains a list of invasive plant species known to occur in the Tucson Mountains (Rondeau et al. 1996, NPS 2004).

Family	Common name	Latin name	Rondeau et al.	SAGU EA
Agavaceae	American agave	Agave americana v. expansa	✓	
Aizoaceae	horse purslane	Trianthema portulacastrum		✓
Anacardiaceae	African sumac	Rhus lancea	✓	✓
Apiaceae	wild celery	Apium leptophyllum	✓	
Apiaceae	cilantro	Coriandrum sativum	✓	
Apocynaceae	oleander	Nerium oleander		✓
Asteraceae	Malta starthistle	Centaurea melitensis	✓	✓
Asteraceae		Conyza bonariensis	✓	
Asteraceae	African daisy	Dimorphotheca sinuata	✓	✓
Asteraceae	tarweed	Hemizonia kelloggii	✓	
Asteraceae	prickly lettuce	Lactuca serriola	✓	✓
Asteraceae	pineapple weed	Matricaria matricarioides	✓	
Asteraceae	spiny sow thistle	Sonchus asper	✓	✓
Asteraceae	sow thistle	Sonchus oleraceus	✓	✓
Asteraceae	dandelion	Taraxacum spp.		✓
Brassicaceae	field mustard	Brassica campestris	✓	
Brassicaceae	mustard	Brassica eruca	✓	
Brassicaceae	black mustard	Brassica nigra	✓	
Brassicaceae	Sahara mustard	Brassica tournefortii	✓	✓
Brassicaceae	shepherd's purse	Capsella bursa-pastoris	✓	✓
Brassicaceae	flixweed	Descurainia sophia	✓	
Brassicaceae	evening stock	Matthiola longipetala	✓	✓
Brassicaceae	London rocket	Sisymbrium irio	✓	✓
Brassicaceae	tumble mustard	Sisymbrium orientale/ S. altissimum	✓	✓
Cactaceae	cow's tongue prickly pear	Opuntia lindheimeri var. linguiformis	✓	✓
Cactaceae	bunny ears	Opuntia microdasys	✓	
Cannabaceae	marijuana	Cannabis sativa	✓	
Caryophyllaceae	slender chickweed	Cerastium gracile		✓
Caryophyllaceae	burstwort; hairy rupturewort	Herniaria hirsuta ssp. cinerea	✓	
Chenopodiaceae	fetid goosefoot	Chenopodium graveolens var. neomexicanum		✓
Chenopodiaceae	nettleleaf goosefoot	Chenopodium murale	✓	✓
Chenopodiaceae	Russian thistle	Salsola spp.	✓	✓
Convolvulaceae	field bindweed	Convolvulus arvensis	✓	✓
Convolvulaceae	wait-a-minute vine	Merremia dissecta	✓	
Cucurbitaceae	watermelon	Citrullis vulgaris	✓	
Cyperaceae	flat sedge	Cyperus alternifolius	✓	
Cyperaceae	purple nutsedge	Cyperus rotundus	✓	
Euphorbiaceae	ground fig spurge	Euphorbia prostrata	✓	
Fabaceae	yellow bird of paradise	Caesalpinia gillesii	✓	✓
Fabaceae	bur clover	Medicago polymorpha	✓	✓

6. Biological Resources - Vegetation

Family	Common Name	Latin Name	Rondeau et al.	SAGU EA
Fabaceae	alfalfa	Medicago sativa	✓	✓
Fabaceae	alfalfilla	Melilotus indicus	✓	✓
Fabaceae	Mexican paloverde	Parkinsonia acuelata	✓	
Fabaceae	feathery cassia	Senna artemesioides	✓	
Geraniaceae	filaree	Erodium cicutarium	✓	✓
Hydrophyllaceae	desert Canterbury bells	Phacelia campanularia	✓	
Lamiaceae	henbit	Lamium amplexicaule	✓	
Lamiaceae	horehound	Marrubium vulgare		✓
Lamiaceae	shell flower	Molucella laevis	✓	
Linaceae		Linum grandiflorum	✓	
Malvaceae	little mallow	Malva parviflora	✓	✓
Meliaceae	Chinaberry	Melia azedarach	✓	
Molluginacea	threadstem carpet weed	Mollugo cerviana	✓	✓
Oxalidaceae	yellow woodsorrel	Oxalis stricta		✓
Poaceae	beardless rabbitsfoot grass	Agrostis semiverticillata		✓
Poaceae	creeping bentgrass	Agrostis stoloniferavar. palustris		✓
Poaceae	giant reed	Arundo donax	✓	
Poaceae	wild oats	Avena fatua	✓	✓
Poaceae	King Ranch bluestem	Bothriochloa ischaemum	✓	
Poaceae	rescue grass	Bromus catharticus	✓	
Poaceae	ripgut grass	Bromus diandrus	✓	
Poaceae	red brome	Bromus rubens	✓	✓
Poaceae	cheatgrass	Bromus tectorum	✓	
Poaceae	longspine sandbur	Cenchrus longispinus		✓
Poaceae	pampas grass	Cortaderia selloana	✓	✓
Poaceae	Bermuda grass	Cynodon dactylon	✓	✓
Poaceae	Eqyptian grass	Dactyloctenium aegyptium		✓
Poaceae	southern crabgrass	Digitaria ciliaris		✓
Poaceae	hairy crabgrass	Digitaria sanguinalis		✓
Poaceae	jungle ricegrass	Echinochloa colonum	✓	✓
Poaceae	soft feather pappus grass	Enneapogon cenchroides	✓	
Poaceae	Mediterranean lovegrass	Eragrostis barrelieri	✓	
Poaceae	stinkgrass	Eragrostis cilianensis	✓	✓
Poaceae	weeping lovegrass	Eragrostis curvula	✓	✓
Poaceae	lovegrass	Eragrostis echinochloidea	✓	✓
Poaceae	Lehmann lovegrass	Eragrostis lehmanniana	✓	✓
Poaceae	wild barley	Hordeum murinum	✓	✓
Poaceae	little barley	Hordeum pussillum	✓	
Poaceae	goldentop	Lamarckia aurea	✓	✓
Poaceae	natal grass	Melinis repens	✓	✓
Poaceae	blue panicgrass	Panicum antidotale		✓
Poaceae	broomcorn millet	Panicum miliaceum	✓	

6. Biological Resources - Vegetation

Family	Common Name	Latin Name	Rondeau et al.	SAGU EA
Poaceae	dallisgrass	Paspalum dilatatum		✓
Poaceae	buffelgrass	Pennisetum ciliare	✓	✓
Poaceae	fountain grass	Pennisetum setaceum	✓	✓
Poaceae	littleseed canary grass	Phalaris minor	✓	✓
Poaceae	timothy	Phleum pratense		✓
Poaceae	annual bluegrass	Poa annua		✓
Poaceae	Kentucky bluegrass	Poa pratensis		✓
Poaceae	rabbitfoot grass	Polypogon monspeliensis	✓	✓
Poaceae	Mediterranean grass	Schismus spp.	✓	✓
Poaceae	bur bristlegrass	Setaria adhaerans	✓	
Poaceae	Johnson grass	Sorghum halapense	✓	✓
Poaceae	wheat	Triticum aestivum	✓	
Poaceae	rattail fescue	Vulpia myuros	✓	✓
Polygonaceae	prostrate knotweed	Polygonum aviculare		✓
Polygonaceae	sheep sorrel	Rumex acetosella		✓
Polygonaceae	curly dock	Rumex crispus		✓
Rubiaceae	bedstraw	Galium aparine	✓	✓
Rubiaceae	southern bluet	Hedyotis crassifolia		✓
Solanaceae	tree tobacco	Nicotiana glauca	✓	
Tamaricaceae	salt cedar, tamarisk	Tamarix ramosissima	✓	✓
Verbenaceae	lantana	Lantana camera	✓	
Zygophyllaceae	puncture vine	Tribulus terrestris	✓	✓

Invasive Species Management

The Sonoran Desert Weedwackers (SDWW) is a community network of invasive species eradication volunteers originally coordinated by the Southern Chapter of the Arizona Native Plant Society, now also operating under Pima County Natural Resources, Parks, and Recreation (PCNRPR). The purpose of the program is to clear infestations of fountain grass (*Pennisetum setaceum*) and buffelgrass (*Pennisetum ciliare*), and other invasive, non-native species that threaten native plant populations within Tucson Mountain Park. SDWW also cooperate with the goals and objectives of the SDCP, Saguaro National Park, Sonoran Arthropod Studies Institute, Tucson Botanical Gardens, and the Arizona Sonora Desert Museum (ASDM).

SDWW have been actively removing invasive species (with the heaviest emphasis on buffelgrass and fountain grass) with a consistent monthly program of reconnaissance, mechanical and chemical treatment, and monitoring. The program utilizes one PCNRPR staff member approximately quarter time, one volunteer coordinator approximately 5 hours per week, and volunteer groups for manual labor. SDWW have been working regularly since 2000, and reliable record-keeping began in 2002. Since then, the volunteer coordinator has been tracking each event, recording the location, number of volunteers, hours, and number of bags of invasives removed. According to these data (courtesy of Marilyn Hanson, SDWW volunteer coordinator), SDWW have removed nearly

6. Biological Resources - Vegetation

50 tons of invasive biomass from TMP from 2002 – 2006, with the help of over 1,300 volunteers in over 4,500 volunteer hours. The number of tons of buffelgrass removed has increased every year since records have been kept, tripling from nearly 5 tons removed in 2002 to almost 15 tons removed in 2006. Detailed data records are on file at the park.

Summary of SDWW volunteer efforts 2002 – 2006.

		# Volunteers	Total Event Hours	Total Volunteer Hours	# Bags Removed	LBS Biomass (1bag=30 lbs)	Tons of Biomass Removed
RECONNAISSANCE	2002	48	35.5	145	-	-	-
	2003	32	37	116.5	-	-	-
	2004	30.5	50	136.5	-	-	-
	2005	20.5	56.5	117	-	-	-
	2006	24	73.5	133	-	-	-
	subtotal	155	252.5	648	-	-	-
TREATMENT	2002	159	35	350.5	321	9630	4.815
	2003	156	91	532.5	496	14880	7.44
	2004	199.5	64	723.5	606	18180	9.09
	2005	313.5	137	1345	851	25530	12.765
	2006	372	126.5	1320.5	966	28980	14.49
	subtotal	1200	453.5	4272	3240	97200	48.6
TOTAL		1355	706	4920	3240	97200	48.6

6. Biological Resources - Vegetation



Figure 6-D. TMP boundary at San Juan Wash. Vehicle barrier in need of repair to discourage damage to cienega area directly upstream.

Boundary issues

Except for the northern boundary, which is shared by Saguaro National Park, Tucson Mountain Park is becoming increasingly enveloped by residential development. The actions of TMP's neighbors affect the vegetation communities not only at the park boundary, but in some instances are capable of reaching far into the park. Direct impacts include illegal dumping, poaching of plant materials and animals, theft of boulders, cutting and damage to boundary fencing (Figure 6-D), social and wildcat trail-blazing. Adjacent private property owners are not always aware and/or in conformity with the TMP boundary, as the boundary fence is setback from the actual property line. Encroachment into these areas is very difficult to remedy and can include various kinds of ground disturbance, including landscaping with non-native plants. Indirect (but serious) impacts also arise from the use of invasive ornamental plant species in residential landscaping.

Trails and Recreation-related Resource Damage

Roads and trails are conduits for people and their associated impacts to move through the park. Trails should be carefully planned to avoid sensitive resource areas. Park rules and trail information should be available at all trailheads.

6. Biological Resources - Vegetation

Invasive species issues are also often tied to roads and trails (see discussion below). There are extensive networks of unofficial social/wildcat trails that originate from official trails as well as adjacent residential communities (Figure 6-E); these unofficial trails degrade the habitat value and visual quality, amplifying the impacts of official roads, trails, and boundaries. Without control, impacts related to trails and roads are likely to increase as the population and footprint of Tucson continues to grow.



Figure 6-E. Social and wildcat trails in the vicinity of San Juan Wash and the David Yetman Trail.

Lack of Baseline Information and Monitoring

The basis of any adaptive resource management plan is an understanding of baseline conditions, including basic inventory and monitoring information. The vegetation resources of TMP require thorough documentation so that the direct and indirect impacts of increasing urbanization, residential development, climate change, and non-native species invasion can be analyzed and appropriate management actions taken. Because there has been extensive development and implementation of inventory and monitoring protocols at Saguaro National Park (Powell et al. 2006), TMP has an excellent framework to build from.

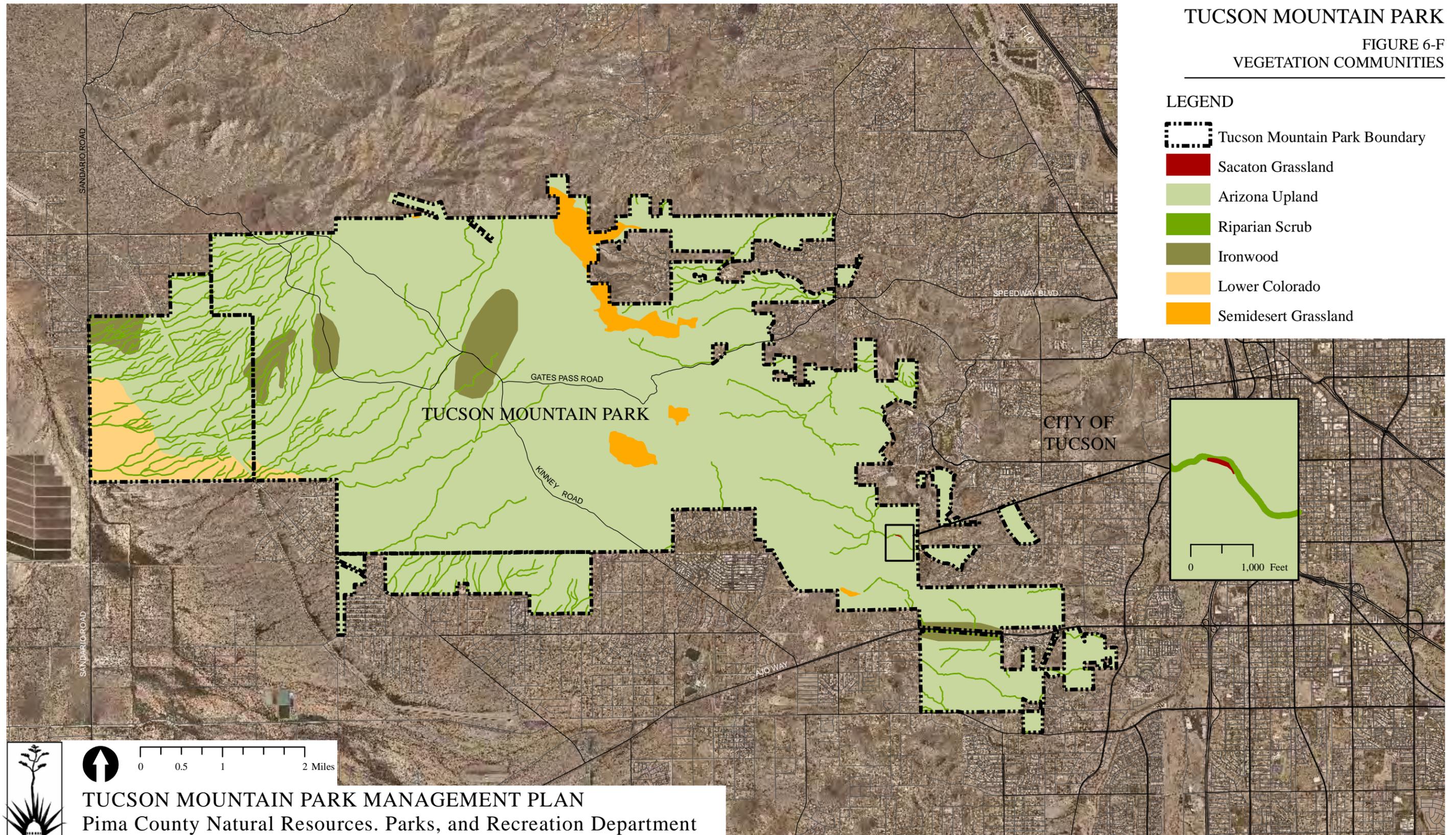
Pima County is in the initial stages of development of its Ecological Effectiveness Monitoring Program (EEMP) (Pima County 2007), which is a required element of the Pima County Multi-Species Conservation Plan. The Pima County EEMP is proposed to be a landscape level monitoring plan which will track a broad suite of biotic and abiotic parameters, including vegetation structure and composition. TMP will likely be an important participant in this program once it is established.

TUCSON MOUNTAIN PARK

FIGURE 6-F
VEGETATION COMMUNITIES

LEGEND

-  Tucson Mountain Park Boundary
-  Sacaton Grassland
-  Arizona Upland
-  Riparian Scrub
-  Ironwood
-  Lower Colorado
-  Semidesert Grassland



0 0.5 1 2 Miles

TUCSON MOUNTAIN PARK MANAGEMENT PLAN
Pima County Natural Resources, Parks, and Recreation Department

Prepared by McGann & Associates Landscape Architects and Planners

7. Biological Resources - Wildlife

- 7.1 Introduction:** The Tucson Mountains are home to a rich diversity of wildlife species including birds, mammals, reptiles, amphibians, and invertebrates. Included are several special status wildlife species.
- 7.2 Overview of Wildlife Resources:** In the course of a single hike through Tucson Mountain Park, it is possible for a keen observer to see an incredibly wide range of wildlife species including large mammals (deer, coyote, and javelina), small mammals (pack rats, mice, and bats), birds (hawks, owls, and songbirds), and reptiles (desert tortoise, Gila Monsters, and rattlesnakes). These diverse wildlife populations, which include species that are iconic features of the Sonoran Desert, make Tucson Mountain Park an attractive destination for visitors from communities throughout the United States and from countries throughout the world.
- The long-term health of these wildlife populations is being challenged by human activity within the park and by urban development at the perimeter of the site. High volumes of motor vehicle traffic on park roads, domestic animals moving into areas surrounding the park, and the fragmentation of natural corridors connecting Tucson Mountain Park with other parks and preserves, are examples of the pressures that currently exist on the park's wildlife populations.
- Understanding and mitigation of these external pressures will be important to the long-term management of the park's wildlife resources.
- 7.3 Pima County Priority Vulnerable Species:** This section includes information on Pima County Priority Vulnerable Species (PVS, Pima County 2001a) that are either known to exist or that could potentially occur in TMP. These species were chosen by the Science and Technical Advisory Team (STAT) through the Sonoran Desert Conservation Plan process to be considered as being included in the Pima County Multi-Species Conservation Plan (PCMSCP) ESA Section 10 permit. PVS are species that 1) occur in Pima County, and 2) have either been listed by the federal government as Threatened or Endangered or recognized by the federal government as imperiled, extirpated species or are species that are in decline, and potentially on the way toward ESA listing. In addition, STAT identified these species as important indicators of overall habitat health in Pima County and/or species that are likely to be impacted by land use decisions.

7. Biological Resources - Wildlife

Name	Habitat Description	Potential to Occur in TMP
BIRDS		
<i>Aimophila carpalis</i> rufous-winged sparrow	Flat or gently hilly Sonoran desertscrub characterized by spiny trees and shrubs (Pima County 2001).	Possible. Although this species has not been recorded from TMP, it is known from the Tucson Mountain District of Saguaro National Park (Powell et al. 2006) and the Black Wash area (Harris Environmental Group 2002).
<i>Athene cunicularia hypugaea</i> western burrowing owl	Variable in open, well-drained grasslands, steppes, deserts, prairies, and agricultural lands, often associated with burrowing mammals. Sometimes in open areas such as vacant lots near human habitation, golf courses or airports (AGFD 2001).	Possible, especially at urban fringes at the western and southern borders of the park.
<i>Buteo swainsonii</i> Swainson's hawk	"Grasslands, semidesert grassland, and savannah grassland, either apart or intermixed with open desertscrub habitats..." (Glinski 1998).	Although this species has not been recently documented in TMP, suitable habitat is present, especially in the WMC. In addition, a 1975 TMP planning document identified this species as known to occur at TMP (Pima County 2001b).
<i>Coccyzus americanus occidentalis</i> western yellow-billed cuckoo	Streamside cottonwood-willow or larger mesquite bosque areas (AGFD 2002).	Unlikely. TMP lacks riparian woodlands; not within SDCP modeled habitat (Pima County 2001).
<i>Empidonax trailii extimus</i> southwestern willow flycatcher	Cottonwood/willow/tamarisk vegetation communities along rivers and streams (USFWS 2006).	Unlikely. Habitat not present at TMP.
<i>Glaucidium brasilianum cactorum</i> cactus ferruginous pygmy-owl	Sonoran riparian deciduous woodland within Arizona upland subdivision and Sonoran desertscrub (AGFD 2001).	The SDCP Priority Conservation Area for this species encompasses the western and northwestern portions of TMP (Pima County mapguide, assessed May 2007).

7. Biological Resources - Wildlife

Name	Habitat Description	Potential to Occur in TMP
BIRDS		
<i>Pipilo aberti</i> Abert's towhee	Sonoran riparian deciduous woodland and riparian scrubland, with a dense understory of shrubs, as well as in Sonoran desertscrub near washes (Pima County 2001).	This species is known to occur in TMP (Pima County 2001b). Suitable habitat is present in xeroriparian washes throughout Sonoran desertscrub, especially those with complex vegetation structure.
<i>Vireo bellii</i> Bell's vireo	Dense, low, shrubby vegetation in riparian areas, especially with willow, mesquite, and seep willow (Pima County 2001).	This species is known to occur in TMP (Pima County 2001b), and has been documented at the adjacent areas in the Tucson Mountain District of Saguaro National Park (Powell et. Al 2006) and Black Wash (Harris Environmental Group 2002).
FISH		
<i>Agosia chryogaster</i> longfin dace	Intermittent low-desert streams to clear and cool brooks at higher elevations. They tend to occupy relatively small or medium size streams, with sandy or gravelly bottoms; eddies, pools near overhanging banks or other cover (AGFD 2002).	Unlikely. TMP lacks streams.
<i>Catostomus clarkii</i> desert sucker	Rapids and flowing pools of streams and rivers primarily over bottoms or gravel-rubble with sandy silt in the interstices. (AFGD 2002).	Unlikely. TMP lacks streams.
<i>Catostomus insignis</i> Sonoran sucker	Warm water of springs, small streams, and marshes (AFGD 2001).	Unlikely. TMP lacks streams.
<i>Cyprinodon macularius</i> desert pupfish	Shallow waters of springs, small streams, and marshes (AGFD 2001).	Unlikely. TMP lacks streams and springs.

7. Biological Resources - Wildlife

Name	Habitat Description	Potential to Occur in TMP
AMPHIBIANS		
<p><i>Rana chiricahuensis</i> Chiricahua leopard frog</p>	<p>Oak, mixed oak and pine woodlands. Natural aquatic systems include cienegas, rocky streams with deep rock-bound pools, river overflow pools, oxbows, permanent springs, permanent pools in intermittent streams, and beaver ponds. Man-made aquatic systems include earthen stock tanks, livestock drinkers, irrigation sloughs, wells. Mine adits. Abandoned swimming pools, and ornamental backyard ponds (AGFD 2006).</p>	<p>Unlikely. TMP lacks streams and springs, and wildlife water sources are at elevations not within the range of this species.</p>
<p><i>Rana yavapaiensis</i> lowland leopard frog</p>	<p>Aquatic systems in desert grasslands to pinyon-juniper. They are habitat generalists and breed in a variety of natural and man-made aquatic systems. Natural systems include rivers, permanent streams, permanent pools in intermittent streams, beaver ponds, cienegas (wetlands), and springs, while man-made systems include earthen cattle tanks, livestock drinkers, canals, irrigation sloughs, wells, mine adits, abandoned swimming pools, and ornamental backyard ponds (AGFD 2006).</p>	<p>Unlikely. TMP lacks streams and springs.</p>
REPTILES		
<p><i>Aspidoscelis burti stictogrammus</i> giant spotted whiptail</p>	<p>Canyons, arroyos, and mesas in arid and semi-arid regions, entering lowland desert along stream courses. Found in dense shrubby vegetation, often among rocks near permanent and intermittent streams or in open areas of bunch grass within these riparian habitats (AFGD 2001).</p>	<p>Unlikely (Phil Rosen, personal communication). TMP lacks habitat with sycamore, cottonwood, and ash.</p>

7. Biological Resources - Wildlife

Name	Habitat Description	Potential to Occur in TMP
REPTILES		
<i>Aspidoscelis burti xanthonotus</i> red-backed whiptail	Canyons and hills in juniper-oak woodlands, down to Sonoran upland desert habitats, among dense shrubby vegetation near and on the banks of semi-arid permanent streams and arroyos. (AGFD 2003).	Unlikely. TMP is outside the range of this species, which is limited to western Pima County (AGFD 2003).
<i>Chionactis occipitalis klauberi</i> Tucson shovel-nosed snake	Arid deserts with sandy washes, dunes and rocky hillsides; they prefer areas with scattered mesquite-creosote bush (AGFD 2002)	Unlikely. Apparently extirpated from the vicinity of TMP (Phil Rosen, personal communication).
<i>Chionactis palarostris organica</i> Organ pipe shovel-nosed snake	Upland desert in the paloverde-saguaro association (AGFD 2001).	Unlikely. TMP is outside the range of this species, which is limited to the vicinity of Organ Pipe Cactus National Monument (AGFD 2003).
<i>Gopherus agassizii (Sonoran population)</i> Sonoran desert tortoise	Rocky slopes and bajadas in Sonoran Desert scrub (AGFD 2001).	Known to occur at TMP.
<i>Kinosternon sonoriense longifemorale</i> Sonoyta mud turtle	Ponds and streams.	Unlikely. TMP lacks water bodies.
<i>Sonora semiannulata</i> ground snake (valley form)	Desert grassland and mesquite thicket valley floors in grassland to encinal slopes (Pima County 2001).	Highly unlikely (Phil Rosen, personal communication). In addition, this species was not recorded from the Tucson Mountain District of Saguaro National Park (Powell et al. 2006).
<i>Terrapene ornata luteola</i> desert box turtle	Grassland and desert grasslands (Pima County 2001).	Unlikely, except as escaped pets (Phil Rosen, personal communication).
<i>Thamnophis eques megalops</i> Mexican garter snake	In Arizona, these snakes are most abundant in densely vegetated habitat surrounding cienegas, cienega-streams, and stock tanks and in or near water along streams in valley floors and generally open areas (Rosen and Schwalbe 1988).	Unlikely. TMP lacks suitable habitat with water resources.

7. Biological Resources - Wildlife

Name	Habitat Description	Potential to Occur in TMP
MAMMALS		
<p><i>Choeronycteris mexicana</i></p> <p>Mexican long-tongued bat</p>	<p>Mesic areas in canyons of mixed oak-conifer woodlands in mountains rising from the desert. Require food resources of paniculate agaves and/or columnar cacti. Caves, abandoned mines, and rock shelters are used for day roosts. (AGFD 2006).</p>	<p>This species has been documented from TMP (Pima County 2001b).</p>
<p><i>Corynorhinus townsendii pallascens</i></p> <p>pale Townsend's big-eared bat</p>	<p>Summer day roosts are found in caves and mines from desertscrub up to woodlands and coniferous forests. Night roosts may often be in abandoned buildings. In winter, they hibernate in cold caves, lava tubes and mines mostly in uplands and mountains from the vicinity of the Grand Canyon to the southeastern part of the state (AGFD 2003).</p>	<p>Known to occur at TMP (AGFD 2003, Pima County 2001b). The SDCP Priority Conservation Area for this species encompasses the western portion of TMP (Pima County mapguide, assessed May 2007).</p>
<p><i>Idionycteris phyllotis</i></p> <p>Allen's big-eared bat</p>	<p>Ponderosa pine, pinyon-juniper, Mexican woodlands, and riparian areas of sycamore, cottonwood, and willow. Roosts in caves and abandoned mine shafts (AGFD 2001).</p>	<p>Unlikely, TMP lacks high elevation mountainous habitat. In addition, this species was not recorded from the Tucson Mountain District of Saguaro National Park (Powell et al. 2006).</p>
<p><i>Lasiurus blossevillii</i></p> <p>western red bat</p>	<p>Broad-leafed deciduous riparian forest and woodlands (AGFD 2003).</p>	<p>Unlikely. TMP lacks suitable habitat. In addition, this species was not recorded from the Tucson Mountain District of Saguaro National Park (Powell et al. 2006).</p>
<p><i>Lasiurus xanthinus =ega</i></p> <p>western yellow bat</p>	<p>Urban situations with palm trees. Low-to-mid elevation riparian communities with broad-leaved deciduous trees (AGFD 2003).</p>	<p>Unlikely. TMP lacks suitable habitat. In addition, this species was not recorded from the Tucson Mountain District of Saguaro National Park (Powell et al. 2006)</p>

7. Biological Resources - Wildlife

Name	Habitat Description	Potential to Occur in TMP
MAMMALS		
<i>Leptonycteris curasoae yerbabuena</i> lesser long-nosed bat	Semi-desert grassland to oak transition. Roosts in caves, mines, tunnels, and old buildings. Forages in areas of saguaros, ocotillo, paloverde, prickly pear, organ pipe cactus, and agaves.	Possible, although this species has not yet been documented from TMP or the Tucson Mountain District of Saguaro National Park (Powell et al. 2006). The SDCP Priority Conservation Area for this species encompasses the central and western portions of TMP (Pima County mapguide, assessed May 2007).
<i>Macrotus californicus</i> California leaf-nosed bat	Sonoran desertscrub. Roosts primarily in mines, caves, and rock shelters (AGFD 2001).	Known to occur at TMP (Wolf and Dalton 2005); eastern half of TMP is included in the SDCP Priority Conservation Area for this species (Pima County mapguide, assessed May 2007).
<i>Peromyscus merriami</i> Merriam's mouse	Riparian or low desert habitats. Found in dense brush, mesquite bosque (AGFD 2001).	Possible, especially in the CAP Wildlife Corridor. This species has not been recently documented in TMP, however, a 1975 TMP planning document identified this species as known to occur at TMP (Pima County 2001b).
<i>Sorex arizonae</i> Arizona shrew	High elevation (5,675 feet and above) areas with downed woody debris (Pima County 2001).	Possible. Although this species has not been recorded from TMP, it is known from the Tucson Mountain District of Saguaro National Park (Powell et al. 2006) and the Black Wash area (Harris Environmental Group 2002).
INVERTEBRATES		
<i>Sonorella</i> spp. Talussnails	Limestone rocks with cracks or talus formations; usually north-facing and near hilltops or in rocky canyons (Pima County 2001).	Possible. TMP contains limestone outcrops.

7.4 AGFD Heritage Management Data Systems Records Search:

A review of the Arizona Game and Fish Department's Heritage Data Management System (HMDS) was conducted using the Department's On-Line Environmental Review Tool program. This program identifies special status species that could potentially be found within or near Tucson Mountain Park.

7. Biological Resources - Wildlife

More specifically, this program identifies U.S. Fish and Wildlife Service (ESA) federally listed species, U.S. Bureau of Land Management (BLM) and U.S. Forest Service (USFS) sensitive species, and Arizona Game and Fish Department (AGFD) recognized species of concern. The results of this search are as follows:

The results of this search are as follows:

Name	Common Name	ESA	USFS	BLM	AGFD
<i>Aspidoscelis burti stictogrammus</i>	Giant Spotted Whiptail	SC	S	S	
<i>Athene cunicularia hypugaea</i>	Western Burrowing Owl	SC		S	
<i>Coccyzus americanus occidentalis</i>	Western Yellow-billed Cuckoo	C	S		WSC
<i>Cyprinodon macularius</i>	Desert Pupfish	LE			WSC
<i>Dendrocygna autumnalis</i>	Black-bellied Whistling Duck				WSC
<i>Dendrocygna bicolor</i>	Fulvous Whistling-Duck	SC			
<i>Gastrophryne olivacea</i>	Great Plains Narrow-mouthed Toad				WSC
<i>Gopherus agassizii</i> (Sonoran Population)	Sonoran Desert Tortoise	SC			WSC
<i>Macrotus californicus</i>	California Leaf-nosed Bat	SC			WSC
<i>Myotis velifer</i>	Cave Myotis	SC		S	
<i>Nyctinomops femorosaccus</i>	Pocketed Free-Tailed Bat			S	
<i>Poeciliopsis occidentalis occidentalis</i>	Gila Top Minnow	LE			WSC

HS = Highly Safeguarded
 LE = Listed / Endangered
 S = Sensitive
 SC = Species of Concern
 SR = Salvage Restricted
 WSC = Wildlife of Special Concern in Arizona

7. Biological Resources - Wildlife

7.5 Special Status Species Known or Likely to Occur within the Park:

Fifteen special status wildlife species are known to occur, or are likely to occur, within Tucson Mountain Park. A description of each of these species is provided below.

Mammals

LESSER LONG-NOSED BAT: *Listed Endangered, AGFD Wildlife of Special Concern, Bureau of Land Management Sensitive, Pima County Priority Vulnerable Species*

Arizona is at the extreme northern edge of the lesser long-nosed bat's distribution; it is found from the Picacho Mountains to the north, the Agua Dulce Mountains in the southwest, and the Galiuro and Chiricahua mountains in the southeast. Although this species has not been documented from TMP, suitable habitat does exist there.

Lesser long-nosed bats are believed to have declined significantly based on the reduction of the numbers and sizes of maternity colonies in Arizona and Sonora as a result of exclusion and disturbance. Loss of agaves by grazing, agricultural harvest, and development has reduced foraging habitat for lesser long-nosed bats in Arizona and elsewhere in its range. Loss and disturbance of roost sites also pose a significant threat to lesser long-nosed bats and can occur through recreational caving and mine exploration, closure of abandoned mines for hazard abatement, renewed mining, vandalism, and exclusion of bats from roosting areas.

Lesser long-nosed bats are migratory, since they do not hibernate and cannot withstand prolonged exposure to cold temperatures. In September and October, they migrate to Mexico, where they breed and spend the winter. Females return to Arizona pregnant as early as the second week in April.

Habitat associations of the lesser long-nosed bat vary seasonally in Arizona. During April until July, the lesser long-nosed bat is known from semidesert grasslands and Sonoran desert scrub at elevations below 3,500 feet (1,067 meters) (AGFD 2003). From July to late September/early October, this bat moves up to Madrean evergreen woodland (oak transition regions) at elevations up to 5,500 feet (1,676 meters) (AGFD 2003). Within these plant communities, lesser long-nosed bats require two critical resources: 1) suitable day roosts and 2) sufficient concentrations of food plants. The distribution of these resources determines where these bats specifically occur.

In Arizona, lesser long-nosed bats feed on nectar, pollen, and fruits of saguaro and organ pipe cactus in early summer and agave later in the summer and early autumn. Lesser long-nosed bats have been reported to visit hummingbird feeders at night in the Huachuca, Chiricahua, and Santa Rita Mountains. Their spring migration from central Mexico northward is thought to follow the sequential blooming of certain flowers from south to north.

7. Biological Resources - Wildlife

For day roosts, the lesser long-nosed bat uses caves, mine tunnels, and occasionally old buildings. This bat appears to be the most dependent on the availability of inactive mines of the North American bat species. Most Arizona records are from inactive mines. These bats use night roosts for digesting their meals. Night roosts can be the bats' day roosts or other caves, mines, rock crevices, trees and shrubs, and occasionally abandoned buildings (AGFD 2003). The extent to which night roosts represent essential habitat in this species is currently uncertain.

Potential roost sites (especially abandoned mines) and abundant food resources (saguaro cactus) are present across large areas of TMP. This bat could potentially roost and/or forage at TMP during the summer when saguaros are flowering and fruiting. In addition, the SDCP Priority Conservation Area for this species encompasses the central and western portions of TMP (Pima County mapguide, assessed May 2007).

CALIFORNIA LEAF-NOSED BAT: *ESA Species of Concern, AGFD Wildlife of Special Concern, Pima County Priority Vulnerable Species*

The California leaf-nosed bat is primarily a Sonoran Desert species, but is also occasionally found in the Chihuahuan and Great Basin deserts. Daytime roosting sites are usually mines and caves, and nighttime roosts include open buildings, cellars, bridges, porches, and mines. These bats do not hibernate or migrate; therefore, they tend to live in the same area year after year (although not necessarily in the same roost) and remain active year-round (AGFD 2001).

The California leaf-nosed bat is threatened by human disturbance which may cause abandonment of roosts; loud noises in roosts may disorient the bats and also negatively affect reproductive success (AGFD 2001). Closure of mines for hazard abatement, renewal of mining activity, and improper gating are serious concerns for this species (AGFD 2001).

This species is documented from mines at TMP, and there is a body of recent survey and monitoring work available (Wolf and Dalton 2005, 2006, 2007a, 2007b). A particularly important roost site is the Tucson Bat Mine, which is the only site in the Tucson Mountains known to support this species year-round (Wolf and Dalton 2005). This mine received an improved vandal-resistant gate in February of 2007 (Wolf and Dalton 2007b). In addition, the eastern half of TMP is designated a SDCP Priority Conservation Area for this species.

CAVE MYOTIS: *ESA Species of Concern, Bureau of Land Management Sensitive*

The cave myotis is a large bat found in the southwestern half of Arizona and the immediately adjacent parts of California, Nevada, New Mexico, and the northern third of Sonora, Mexico. Within Arizona, this bat is found south of the Mogollon Plateau and typically prefers desertscrub habitats of creosote,

7. Biological Resources - Wildlife

brittlebush, paloverde, and cacti but they sometimes can be found up in pine-oak communities. Cave myotis roost in caves, tunnels, mineshafts, under bridges, and sometimes buildings within a few kilometers of a water source (AGFD 2003). Cave myotis colonies are vulnerable at the roost sites, especially maternity roosts, because they congregate in large numbers (AGFD 2003). This species is documented from mines in TMP (Wolf and Dalton 2005).

MEXICAN LONG-TONGUED BAT: *Pima Co. Priority Vulnerable Species*

The Mexican long-tongued bat has a long, slender nose with a leaf-like structure on the base of the nose. Arizona is at the northern extreme of this species' range, and it is found from the Chiricahua Mountains extending as far north as the Santa Catalina Mountains and west to the Baboquivari Mountains. Habitat for this bat is typically within canyons of mixed oak-conifer forests in mountains at elevations ranging from 3,550 – 7,320 ft (1,080 – 2,230 m) (AGFD 2006), and individuals can specifically be found roosting in mine tunnels, caves, rock fissures, and buildings. This species does not congregate in sizeable maternity or bachelor colonies like *Leptonycteris* bats do (Hoffmeister 1986), and does not tend to roost with other bat species (AGFD 2006). They feed on nectar and pollen, especially from paniculate agaves, and migrate seasonally following food resources (AGFD 2006).

Populations of Mexican long-tongued bats in Arizona appear to be highly variable (AGFD 2006) and there is no evidence of a long-term decline or any clear trend. The limitation of riparian zones and the distribution of food plants may limit populations of this species in Arizona and loss of riparian vegetation may be a greater threat to this species than human disturbance at particular roost sites (Pima County 2001a).

This species has been documented from TMP (Pima County 2001b), where foraging on paniculate agaves is possible at the higher elevations.

PALE TOWNSEND'S BIG-EARED BAT: *Pima County Priority Vulnerable Species*

The pale Townsend's big-eared bat ranges throughout western North America from southern British Columbia south through the Pacific Northwest and southern California on the west and the Black Hills of South Dakota and West Texas on the east through the Mexican uplands to the Isthmus of Tehuantepec in southern Mexico.

The species is widespread throughout Arizona, although not considered common anywhere, and is least common in northeastern grasslands and southwestern desert areas. It has been found from 550 to 7,520 ft (165 – 2,290 m) in elevation. Most records, however, come from above 3,000 ft (915 m) (Hinman and Snow 2003).

7. Biological Resources - Wildlife

The overall population status and trend of pale Townsend's big-eared bat is uncertain, but the species is believed to have declined in parts of its range. The pale Townsend's big-eared bat is threatened by: human disturbance at major maternity roosts; renewed mining; closure and sealing of abandoned mines naturally or for hazard abatement; vandalism at maternity and hibernation sites; loss of foraging habitat; and possibly exposure to pesticides (AGFD 2003). This bat feeds heavily on noctid moths, which require wetland habitats such that declines in wetland habitats also could contribute to bat population declines.

In Arizona, summer day roosts include caves and mines in areas of desertscrub, oak woodlands, oak/pine, pinyon/juniper, and coniferous forests. Pale Townsend's big-eared bats prefer to hang from open ceilings at roost sites and do not use cracks or crevices. At maternity roosts, these bats apparently prefer the dim light near the edge of the lighted zone. In Arizona, emergence times and especially return times and patterns probably vary, as they do elsewhere depending on insect activity and development stage of young. Night roosts are often in abandoned buildings (Hinman and Snow 2003).

In winter, big-eared bats hibernate in cold caves, lava tubes and mines. In Arizona, hibernation sites are mostly in upland and mountainous areas from the vicinity of the Grand Canyon to the southeastern part of the state. Winter roosts generally contain fewer individuals (usually singles or small groups, and in Arizona, occasionally as many as 50) than summer roosts (Hinman and Snow 2003). Foraging occurs over desert scrub, riparian habitats, wetlands or open water, typically within 15 miles of the roost sites.

This species is known to occur in TMP (AGFD 2003; EPG 2005; Pima County 2001b) and the SDCP Priority Conservation Area for this species encompasses the western portion of TMP (Pima County mapguide, assessed May 2007).

MERRIAM'S MESQUITE MOUSE: *Pima Co. Priority Vulnerable Species*

Merriam's mesquite mouse (*Peromyscus merriami*, mesquite mouse) populations were historically found in the large mesquite forests along rivers throughout Pinal, Pima, and Santa Cruz counties in Arizona and into Sonora, Mexico. In Arizona, this mouse has been found in the south central part of the state, from just north of Florence at the north, southeast of Tucson to the east, Lukeville to the west, and Nogales to the south. In Pima County, this mouse has been found in areas of Organ Pipe Cactus National Monument, Sabino Canyon, Arivaca, Baboquivari Mountains, San Xavier, Fort Lowell (Hoffmeister 1986, Pima County 2001a) and in TMP (Pima County 2001b).

Mesquite mice are inhabitants of mesquite-dominated floodplain vegetation at elevations ranging from 1,600 feet to 3,850 feet in riparian or low desert habitats (AGFD 2001, Hoffmeister 1986). Most areas where mesquite mice were historically present have been altered. Historical habitat in Pima County includes the Santa Cruz River (in the San Xavier area) and Wilmot Station southeast of Tucson (Pima County 2001a).

7. Biological Resources - Wildlife

An evaluation of the mesquite mouse conducted in 2006 (SWCA 2006) indicated that this species was not uncommon in the appropriate habitat within Pima County, which appears to be mesquite-dominated vegetation on floodplain soils. These mice were found not only in large mesquite bosques, but also in several different vegetation associations, including: semidesert grassland, xeroriparian scrub; Sonoran desertscrub, xeroriparian scrub; and Sonoran riparian deciduous forest and woodlands, mesquite series (SWCA 2006). In addition, mesquite mice were found to be geographically widespread in eastern Pima County. They were found near the northern, southern, and eastern boundaries of their historically known range, where potentially suitable habitat could be sampled (SWCA 2006). Within Arizona, the greatest threat to mesquite mice is loss and degradation of mesquite-forest habitat. Loss of habitat has occurred through cutting of firewood or clearing for grazing or other development. Groundwater depletion in many places has resulted in the loss of formerly lush riparian areas with large mesquite trees or dense vegetation. Re-establishment and re-generation of suitable habitat for this species may be precluded by groundwater depletion (Pima County 2001a).

This mouse is primarily nocturnal and active throughout the year. Diet of the mesquite mouse is not fully understood, however, they are thought to be granivores, herbivores, and invertivores. Their diet is probably similar to that of the cactus mouse, which feeds on fruit, flowers, seeds of shrubs, insects, and some green vegetation (NatureServe 2007).

This species has not been recently documented in TMP, however suitable habitat exists in the Wildlife Mitigation Corridor. In addition, a 1975 TMP planning document identified this species as known to occur at TMP (Pima County 2001b).

Birds

WESTERN BURROWING OWL: *ESA Species of Concern, Bureau of Land Management Sensitive, Pima County Priority Vulnerable Species*

Burrowing owls are distributed throughout much of the western United States. Burrowing owls have declined in abundance throughout most of their range and local populations are especially prone to extinction in this species (Haug et al. 1993). The species is listed as endangered or sensitive in 14 states in the U.S. and as threatened or endangered in four provinces in Canada. It has been petitioned for state listing in California.

Currently, there are two major breeding populations in Arizona, one in the Tucson area at Davis-Monthan Air Force Base and west branch Santa Cruz River floodplain (Estabrook and Mannan 1998) and one in the Yuma area where high numbers of burrowing owls have been reported along the irrigation canals. Southern Arizona populations are non-migratory (AGFD 2001).

7. Biological Resources - Wildlife

Threats to burrowing owls in Arizona include: reduced prey base due to prairie dog and ground squirrel control programs; disease, including disease impacts on prey species; conversion and urban development of natural habitat and agricultural lands; urbanization increasing predation by domestic and/or feral animals or children, and potential for vehicle strikes; and agricultural pesticides (Klute et al. 2003).

Burrowing owls inhabit open areas, such as grasslands, pastures, coastal dunes, desert scrub, and the edges of agricultural fields. They also inhabit golf courses, airports, cemeteries, vacant lots, and road embankments or wherever there is sufficient friable soil for a nesting burrow (Haug et al. 1993). In the Tucson area, nearly all (97%) of the burrows used for breeding were in undeveloped areas that had been cleared of native vegetation (Estabrook and Mannan 1998).

Burrows are a key habitat requirement for burrowing owls. Owls use burrows for nesting and also require access to alternate burrows to provide escape cover for adults and fledglings. Because they do not excavate their own burrows, burrowing owls are dependent on fossorial mammals such as badgers (*Taxus taxidae*), ground squirrels, and prairie dogs to create burrows. In Arizona, burrowing owls often inhabit areas supporting prairie dog (*Cynomys gunnisoni*) and round-tailed ground squirrel (*Spermophilus tereticaudus*) populations (deVos 1998). These burrowing mammals usually inhabit open environments and create burrows that the owls require as well as maintain vegetation at a short height (deVos 1998). Burrowing owls are opportunistic feeders; in Arizona, they feed primarily on large insects and small mammals, as well as fish, reptiles, amphibians, birds and even prickly pear cactus seeds (AGFD 2001).

This species is not documented from TMP, but there is potential habitat at the urban fringes along the western and southern boundaries of the park.

CACTUS FERRUGINOUS PYGMY-OWL: *AGFD Wildlife of Special Concern, Pima County Priority Vulnerable Species*

The cactus ferruginous pygmy-owl is the northernmost occurring of three subspecies of the ferruginous pygmy-owl (AGFD 2001). This subspecies has a contentious federal listing history, and although it was listed as an endangered species in 1997, that status was remanded as a result of litigation in 2006.

Historically, pygmy-owls were relatively common and occupied extensive areas of southern Arizona, most commonly reported in cottonwood-mesquite forest and mesquite woodlands. These habitat types have undergone an extensive and well-documented decline in the past decades (Busch and Smith 1995). Currently, the Arizona population appears to have a patchy distribution, with most pygmy owls located in one of four general areas: northwest Tucson and southern Pinal County, Organ Pipe Cactus National Monument, the Tohono O'odham Nation, and Altar Valley (Richardson et al. 2000). In recent years, pygmy-owls have

7. Biological Resources - Wildlife

been observed primarily in the Arizona Upland subdivision of the Sonoran Desertscrub biome, in riparian and xeroriparian (dry washes) areas, and in semidesert grasslands (USFWS 2003).

Although loss of riparian habitat may have been the primary threat to pygmy-owls in Arizona, currently the loss and fragmentation of upland vegetation from large-scale residential and commercial developments has also been identified as an important threat (USFWS 2003). Development pressure is seen as the primary threat to conservation of habitat for this species in northwest Tucson (USFWS 2003). Activities that may affect habitat include: clearing vegetation, indirect effects of urbanization, agricultural encroachment, road-building, high-impact recreation, water diversion or impoundment, channelization of drainages, groundwater pumping, livestock grazing, and hydrologic changes resulting from various land use practices (USFWS 2003).

The proposed rule for designation of critical habitat for the Arizona population segment pygmy-owls identified the following as primary constituent habitat elements necessary for the conservation of the species (USFWS 2002):

- Elevations below 4,000 ft (1,220 m) within the biotic communities of: Sonoran riparian deciduous woodlands; Sonoran riparian scrubland; mesquite bosques; xeroriparian communities; tree-lined drainages in semidesert, Sonoran savanna, and mesquite grasslands; and the Arizona Upland and Lower Colorado River subdivisions of the Sonoran desertscrub;
- Nesting cavities in trees including, but not limited to, cottonwood, willow, ash, mesquite, palo verde, ironwood, and hackberry with a trunk diameter of 6 in (15 cm) or greater (measured at 4.5 ft (1.4 m) from the ground), or large columnar cactus such as saguaro or organ pipe greater than 8 ft (2.5 m) in height;
- Multi-layered vegetation (presence of canopy, mid-story, and ground cover) provided by trees and cacti in association with shrubs such as acacia, prickly pear, desert hackberry, graythorn, etc., and ground cover such as triangle-leaf bursage, burro weed, grasses, or annual plants;
- Vegetation providing mid-story and canopy-level cover in a configuration and density compatible with pygmy-owl flight and dispersal behaviors; and
- Habitat elements configured and human activity levels minimized so that unimpeded use, based on pygmy-owl behavioral patterns, can occur during dispersal and within home ranges.

Pygmy-owls are obligate cavity nesters, meaning that they almost exclusively utilize natural cavities or cavities created by other species (Cartron et al. 2000). Historically, pygmy-owls in Arizona used cavities in cottonwood, mesquite, ash trees, and saguaro cacti for nest sites (USFWS 2002). Recently, most known nest sites are in saguaro cacti.

Pygmy-owls require habitat linkages, within and among territories, for movement and dispersal. Habitat linkages consist of continuous cover or patches of trees and large shrubs spaced at regular intervals, to provide concealment and protection from predators and mobbing. These areas also provide shade and

7. Biological Resources - Wildlife

cover to moderate temperature extremes. Little is known about the rate or causes of mortality in pygmy-owls or their life expectancy; however, they are susceptible to predation from a variety of species, such as great horned owls, Harris' hawks, Cooper's hawks, screech-owls, and domestic cats (USFWS 2002). Other threats include direct and indirect human-caused mortalities, such as collisions with cars, glass windows, fences, and power lines; illegal dumping of toxic waste; and wildfire (USFWS 2003). Other natural and human induced factors that could affect the subspecies include low levels of genetic variation, possible contamination from pesticides, potential competition with other birds for nesting cavities, concentration of recreational birding activities at remaining known locations, disease (e.g. Trichomoniasis), and nest predation (USFWS 2003).

Human activities near nest sites at critical periods of the nesting cycle also can cause pygmy-owls to abandon their nests (USFWS 2003). Pygmy-owl habitat also can be compromised by the presence of barriers to movement, including roads, interstates, canals, and alterations of functional drainages (Pima County 2001a).

The Tucson Mountains, including TMP, were included in the proposed Critical Habitat for the pygmy-owl. In addition, the Tucson Mountains are included in a Special Species Management Area for the pygmy-owl, which requires mitigation for ground disturbances of over 20 percent. The Tucson Mountains have been surveyed extensively (with no detections), in both TMP and Saguaro National Park, as well as in association with private development, especially along the eastern boundary of TMP. Although there are no confirmed occurrences of pygmy-owls within TMP, there are several anecdotal or unconfirmed reports – from near ASDM, Anklam Wash, and Kings Canyon. There also was an unconfirmed pygmy-owl report during surveys along Picture Rocks Road around 2000. The nearest confirmed pygmy-owl was from Lazy K Bar Ranch north of TMP (unknown year) (Scott Richardson, personal communication, June 29, 2007).

RUFOUS-WINGED SPARROW: *Pima County Priority Vulnerable Species*

The rufous-winged sparrow is classified as a migratory bird and is a resident of eastern Pima County, including Avra Valley. It was once thought to be extirpated in Arizona due to overgrazing, but was rediscovered in the Tucson Area in 1936 (Pima County 2001a). Arizona Breeding Bird Atlas surveys between 1993 and 1999 indicate the species may now be fairly common within its range (Pima County 2001a).

Threats to rufous-winged sparrows include urban development, overgrazing, and exotic species, all of which result in losses of grassland communities utilized by this species. Furthermore, this species does not thrive in areas of dense human development and activity (Pima County 2001a).

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Rufous-winged sparrows generally use habitats characterized by scattered low shrubs and trees, which provide cover and foraging areas during mid-summer days. Many of these areas contain significant grassland components.

Reproduction typically coincides with summer rains, which result in increased production of insects and seeds, the primary food items for this species during breeding season (Lowther et al. 1999).

Although this species has not been recorded from TMP, it is known from the Tucson Mountain District of Saguaro National Park (Powell et al. 2006) and the Black Wash area (Harris Environmental Group 2002).

SWAINSON'S HAWK: *Pima County Priority Vulnerable Species*

The Swainson's hawk is a common summer resident of southeastern Arizona, with lessening occurrence in central and south-central Arizona (AGFD 2001). This bird inhabits semidesert grassland areas, either apart or intermixed with open desertscrub habitats of the Sonoran, Mohave, Chihuahuan, and Great Basin Deserts (Glinski 1998) Swainson's hawk will nest in almost any tree of suitable size, including: catclaw acacia, cholla cactus, mesquite, desert willow, paloverde, ironwood, and saguaro (Glinski 1998). The prey base includes rodents, rabbits, reptiles and amphibians, birds (mostly fledglings), and large insects such as grasshoppers (AGFD 2001).

Although this species has not been recently documented in TMP, suitable habitat is present, especially in the Wildlife Mitigation Corridor. In addition, a 1975 TMP planning document identified this species as known to occur at TMP (Pima County 2001b).

ABERT'S TOWHEE: *Pima County Priority Vulnerable Species*

Abert's towhee is an elusive riparian obligate bird that can be found along many of the more significant washes within Pima County. While this species appears to be declining because of the loss of riparian habitat, it may tolerate some degree of human influence within its habitat (Pima County 2001a). The primary threat to Abert's towhee is continued loss of riparian habitat due to development, agriculture, grazing, and groundwater pumping. Abert's towhee may be more numerous along perennial water systems, but the presence of high-density riparian trees and shrubs is likely the more important component for this species (Pima County 2001a). It is known from Sonoran riparian deciduous woodland and riparian scrubland, with a dense understory of shrubs, as well as in Sonoran desertscrub near washes (Pima County 2001a).

This species is known to occur in TMP (Pima County 2001b). Suitable habitat is present in xeroriparian washes throughout Sonoran desertscrub, especially those with complex vegetation structure.

7. Biological Resources - Wildlife

BELL'S VIREO: *Pima County Priority Vulnerable Species*

This species has been declining along major river systems in the state, but is common along many smaller upland riparian areas around Tucson (Pima County 2001a). The primary threat to this species is the loss of riparian habitat to development. Bell's vireos are riparian-obligate species that prefer dense, low, shrubby vegetation in riparian areas. While this species is typically associated with native riparian vegetation such as cottonwood-willow and mesquite woodlands, it also utilizes areas invaded by non-native tamarisk (*Tamarix ramosissima*). Riparian vegetation is recognized as a declining habitat type within Pima County even though it receives some protection from direct impacts through the County's Watercourse and Riparian Habitat Protection and Mitigation ordinance.

This species is known to occur in TMP (Pima County 2001b), and has been documented at the adjacent areas in the Tucson Mountain District of Saguaro National Park (Powell et. al 2006) and Black Wash (Harris Environmental Group 2002).

Reptiles and Amphibians

SONORAN DESERT TORTOISE: *ESA Species of Concern, AGFD Wildlife of Special Concern, Pima County Priority Vulnerable Species*

Desert tortoises are divided by the Colorado River into two populations with different protections. The Mojave desert tortoise occurs north and west of the Colorado River, and the Sonoran desert tortoise occurs south and east of the river (AGFD 2001). The Mohave desert tortoise was federally listed as a threatened species in 1990 (USFWS 1990). The Sonoran population was determined to not warrant such listing in 1991, but was retained as a candidate for federal listing in Category 2 (USFWS 1991). However, the USFWS has discontinued use of the Category 2 designation, and the Sonoran desert tortoise is no longer a candidate for inclusion on the list of federal threatened and endangered species (USFWS 1996). Within Arizona, the Sonoran desert tortoise is a Wildlife Species of Special Concern.

Sonoran desert tortoises appear to be most abundant in the Arizona Upland subdivision where they occupy rocky slopes and bajadas (AGFD 2001). Desert tortoises are long-lived terrestrial species with estimates of maximum age in the 50–60 year range (Germano 1994). Eggs and hatchlings are vulnerable to predation; however, adults are well protected by the hard outer shell and are therefore much less vulnerable. Desert tortoises are herbivores and are known to eat a wide variety of native plant species (see Van Devender 2002). Sonoran desert tortoises are typically active during the spring, and especially active after summer rains from early July through October. Activity patterns of the desert tortoise are closely tied to ambient temperatures, moisture, and forage

7. Biological Resources - Wildlife

availability. Desert tortoises spend much of their lives in burrows. Their active season is typically defined as March 1 through October 31.

The Arizona Interagency Desert Tortoise Team (AIDTT) reported in its 2000 status update that most Sonoran desert tortoise populations appeared to be stable, but that habitat was becoming increasingly fragmented by urban and agricultural development. The AIDTT cautioned that because individual tortoises are long-lived, potential impacts of population isolation may not be seen for many years and that the degree to which local populations depend on interchange with other populations for long-term persistence is unknown, as are the effects of dismissing intermountain valleys as “unsuitable” habitat in Sonoran desert tortoise conservation efforts (AIDTT 2000).

Threats to this species include direct and indirect human-caused mortality. Impacts such as destruction, degradation, and fragmentation of habitat due to urbanization, agricultural development, livestock grazing, mining, roads, utility corridors, off-road vehicle recreation, and direct losses from human activities and disease have contributed to population declines (AGFD 2001). Another threat to Sonoran desert tortoise populations is the increased frequency of extensive low desert fires fueled by the invasion of non-native grasses; desert tortoises experience direct mortality in these events as well as long-term alteration of non-fire adapted Sonoran Desert habitat (Brooks et al. 1999).

AIDTT noted that in general, contacts between people and wild tortoises usually end to the detriment of tortoises (e.g., collection, handling, vandalism, crushing under vehicle tires, and shooting) (AIDTT 2000). In January of 1988, the Arizona Game and Fish Commission prohibited the take of desert tortoises from the wild except with special collecting permits; despite this, periodic illegal collection is still known to occur in the Tucson area.

Even more serious than poaching however, are the potential impacts related to the release and escape of captive Sonoran Desert tortoises as well as other non-native pet tortoise species. These events can incur genetic contamination of wild populations and exposure to disease. Diseases such as upper respiratory tract disease (URTD) and cutaneous dyskeratosis do not appear to be having serious impacts on current populations, have not yet played a major role in Sonoran desert tortoises yet, the AIDTT warned that the threat should not be underestimated due to the catastrophic effects URTD has had on tortoise populations in the Mojave Desert (AIDT 2000). URTD may have been introduced into multiple sites in the Mojave Desert by released native and non-native pet tortoises (Jacobson 1993).

Sonoran desert tortoises are known to occur throughout the Tucson Mountains, including TMP.

7. Biological Resources - Wildlife

GREAT PLAINS NARROW-MOUTHED TOAD: *AGFD Wildlife of Special Concern*

Arizona is at the northern extreme of the range of this species, which is found in semidesert grasslands and Sonoran desertscrub vegetation communities from Santa Cruz County, north to Maricopa County and west to near Ajo in western Pima County. This nocturnal toad is active after spring and summer rains which stimulate breeding. These toads share burrows with tarantulas, lizards, moles, and many other creatures. Great plains narrow-mouthed toads are more terrestrial than aquatic, and adult toads eat ants almost exclusively (AGFD 2003)

This species is potentially present in the southern and western low-lying areas of TMP (Phil Rosen, personal communication, June 6, 2007).

Invertebrates

TALUS SNAILS: *Pima County Priority Vulnerable Species*

Talus snails (*Sonorella* spp.) are rock snails, usually found in taluses or “slides” of coarse broken rock. There are about 60 species and subspecies of talus snails within Arizona and available evidence indicates that previously widespread taxa became localized by repeated episodes of isolation and dispersal during climate changes (Pima County 2001a). Populations of talus snails in Pima County are probably relicts of a large population of snails that inhabited the Santa Cruz River Valley during a pluvial period during the late Pleistocene (NatureServe 2006). The total range of most of the known species of talus snails in and around Pima County is typically smaller than area of a moderate-sized house; in addition, they are highly localized to talus slopes (Pima County 2001a).

Potential range-wide threats to talus snails include urban development, vandalism, road construction or maintenance (USFWS 1998). Because the total known range of most talus snails in Arizona is typically a few hundred square meters, relatively minor perturbations of the habitat may result in significant impacts to the population (Pima County 2001a).

Within Pima County, talus snails are known to occur in elevations ranging from 3,200 to 3,900 ft (975 – 1,190 m). These snails are desert adapted and attach to a rock by a mucus and calcium seal. In general, desert snails are known to protect themselves from drying out by crawling into deep, cool rockslides that are not filled with soil. Limestone rocks or other talus that contain calcium carbonate are crucial to the species as these areas provide minerals for shell deposition and neutralize carbonic acid that is produced during the talus snail’s prolonged periods of estivation. Talus snails may remain in estivation for up to 3 years and in most years they are only active for several days when moisture conditions are suitable. Their lifespan is probably 7 to 10 years (AGFD 2003).

After a rain, talus snails lay eggs, feed, and when they meet, they will mate. Fertilization and production of eggs takes several days. If rains are short-lived,

7. Biological Resources - Wildlife

eggs must be held until the next rain. Development in the shell takes approximately a month but eggs do not hatch until a soaking rain has occurred after their development is completed. In the wild, it probably takes 3 or 4 years for talus snails to mature, depending on how often it rains. Talus snails in Pima County typically feed on fungus and decaying plant material with some young shoots when they are available (AGFD 2003).

Apparently all *Sonorella* spp. live in isolated, undisturbed areas of rocks, generally, but not exclusively, limestone, mostly, if not exclusively, on north-facing or trending slopes. Most species are usually found near hilltops or in rocky canyons (Pima County 2001a). These snails are generally found in crevices one to several feet below the surface, sealed to stones by their mucus.

Sonorella magdalensensis has been documented from the southern Tucson Mountains, as well as from Tumamoc Hill (Bequaert and Miller 1973). EPG (2005) noted that the rocky hillsides within newer parcels south of Ajo Way could support talus snails.

7.6 Threats and Stressors to Wildlife

Mines and Caves

There are over 200 mine shafts in the Tucson Mountains that include six significant roosting sites (Wolf and Dalton 2006) for bats. One of these occurs within TMP -- the Tucson Bat Mine, supports year-round roosting habitat for the California leaf-nosed bat. Many of the other mines are used in smaller numbers by migratory bats (Wolf and Dalton 2007a). Mines can be both beneficial in that they can provide roosting habitat for a variety of bat species and detrimental in that vertical shafts can provide hazardous conditions for other species, such as Sonoran Desert tortoises, to fall into and be injured or killed (Figure 7-A).



Figure 7-A. Open pit in San Juan Wash, Located in close proximity to residential homes, the park boundary, and trails.

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Hunting

The Arizona Game and Fish Commission regulates hunting in the state of Arizona. Tucson Mountain Park is located within the Tucson Mountain Wildlife Area (TMWA) of Game Management Unit 38M. The TMWA was established to address homeowner concerns regarding the discharge of firearms near their properties and to preserve hunting opportunities in the Tucson area. Arizona Administrative Code R12-4-802 contains restrictions for each of the 32 Wildlife Areas in Arizona, and the restrictions specific to the TMWA are:

- Closed to discharge of all firearms,
- Open to hunting in season with bow and arrow only, and
- Archery deer and archery javelina hunters must check in with the Arizona Game and Fish Tucson Regional Office prior to going afield.

Bow hunting must comply with all rules, regulations and other requirements of the Arizona Game and Fish Department (Res. 2000-3, § 2, 2000), however the discharge of archery weapons is not permitted within the following areas at TMP:

- 660 ft (200 m) of either side of the centerline of Gates Pass Road between Gates Pass Overlook and the intersection of Gates Pass Road and Kinney Road,
- 660 ft (200 m) of the David Yetman Trail from G-3 entry to the 22nd Street entry.
- 2,640 ft (800 m) of the park boundary around Tucson Estates including all the Little Cat Mountain range between Starr Pass Trail and the David Yetman Link Trail,
- 2,640 ft (800 m) of the boundaries of the Old Tucson premises, the Arizona-Sonora Desert Museum premises, the Sonoran Arthropod Studies premises and the Gilbert Ray Campground.

Although Pima County can not regulate hunting, which is the purview of the Arizona Game and Fish Commission, it can restrict the use of any weapons on county-owned lands for safety reasons.

Approximately 200 - 300 permits are issued annually at TMP for javelina and deer.

Collection of Amphibians and Reptiles

The Arizona Game and Fish Commission Orders 41 and 43 pertain to the take of amphibians and reptiles, respectively, and identify areas closed to this activity, none of which occur within Pima County parks

The Tucson Mountains are world-renowned as a hot-spot for collectors, and poaching is known to occur in both TMP and Saguaro National Park, where collection is prohibited. In January of 1988, the Arizona Game and Fish Commission prohibited the take of Sonoran Desert tortoises from the wild except

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with special collecting permits; despite this, periodic illegal collection is still known to occur in the Tucson area, and most certainly occurs at TMP.

Wildlife Movement Corridors - Connectivity

TMP and the Tucson Mountain District of Saguaro National Park together form an island reserve of over 60,000 acres (24,500 ha). Large mammals require movement corridors between habitats, both within the Tucson Mountains and to other natural areas. Natural wildlife populations are affected by habitat fragmentation caused by the presence of roads, development, and other barriers to movement. Fragmented populations can produce increased demographic fluctuation, inbreeding, loss of genetic variability, and local extinctions. Roads fragment habitat by changing landscape structure, dissecting vegetation patches, increasing the amount of edge, decreasing interior area, and increasing the uniformity of patch characteristics (Gucinski et al. 2001).

Within Pima County, the Central Arizona Project (CAP) Phase B of the Tucson Aqueduct Project runs 76 km from Rillito, Arizona to Tucson, and was constructed in the early 1980s. This project interrupted important wildlife movement corridors between the Tucson Mountains and undisturbed habitat in the Ironwood Forest National Monument, the Roskrige Mountains, and in Avra Valley. Mitigation measures outlined in the associated NEPA documents (Bureau of Reclamation 1985, 1987) included fencing on both sides of the aqueduct to minimize mortality of wildlife by drowning, wildlife crossings over the aqueduct (land bridges), development of wildlife watering sites away from the aqueduct, and revegetation of disturbed areas.

Probably one of the most significant mitigation measures, however, was the establishment of the Wildlife Mitigation Corridor (WMC). This 11 km² mitigation area was purchased by the Bureau of Reclamation and is managed by the Pima County Natural Resources, Parks, and Recreation as part of TMP. The WMC consists of four sections of land located in the western portion of TMP. The WMC alone does not provide a corridor from the Tucson Mountains to the Ironwood Forest National Monument, the Roskrige Mountains, and Avra Valley; that linkage is completed by the Garcia Strip portion of the Tohono O'Odham Nation. Within the Garcia Strip, the integrity of this corridor is threatened by agricultural development (Tull and Krausman 2001). In the vicinity of the Garcia strip, the potential CAP recharge on Tucson Water lands and the potential disposal of Arizona State Trust lands also serve to weaken the corridor.

In studies of movement of large mammals relative to the WMC, it was found that both muledeer and javelina use was higher within WMC crossings, which are characterized by relatively natural conditions, than the crossings in other locations along the canal, which are essentially concrete overpasses with very little natural vegetation (Krausman 1998, Popowski and Krausman 2002).

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Coyotes, however, used the crossings outside of the WMC more often than within it. This study also confirmed that Brawley Wash is important habitat for the rearing of muledeer fawns, and hence, the health and survival of the local population. In addition, wildlife crossings in the WMC adjacent to guzzlers were found to have higher use by herbivores than crossings without guzzlers (Popowski and Krausman 2002). Tull and Krausman (2001) predict that the WMC will become more important for movement of muledeer as land uses change in the surrounding areas. Figure 7-C shows the location of the wildlife guzzlers in relation to the CAP canal, Important Riparian Areas, roads, and surrounding natural areas.

From TMP, important considerations for wildlife movement include south and east to the Santa Cruz River; and west and north to Avra Valley and the Ironwood Forest National Monument. In addition, Pima County has recognized the importance of the corridors between the Tucson Mountains and landscape elements to the west -- the Black and Brawley Washes, the Roskruge, Waterman and Silver Bell Mountains -- as Critical Landscape connections as identified in the Conservation Land System of the Sonoran Desert Conservation Plan.

Roadway-Induced Mortality (Roadkill)

Roadkill has been recognized as a serious wildlife conservation issue for decades, and recently biologists have begun to team with roadway engineers to identify problem areas (e.g., Langen et al. 2007) and design solutions to lessen wildlife mortality. Pima County Department of Transportation (2003) has addressed this issue with its Environmentally Sensitive Roadway Design Guidelines, which address site specific design recommendations, including the accommodation of safe wildlife movement.

Reptiles and amphibians, many of which use roads for cooling and heating, may suffer more significant losses than other types of animals (Rosen and Lowe 1994). Highways and other roads with moderate- to high-speed traffic can function as population sinks for many species of reptiles, resulting in reduced and increasingly isolated populations (Wisdom et al. 2000). Road mortality can also impact populations of special status species; Rosen and Lowe (1994) documented highway mortality of snakes in the Sonoran Desert at Organ Pipe Cactus National Monument, and found significant impacts to two species of conservation interest.

Predators and scavengers may also be killed while they feed on road-killed wildlife (Baker and Knight 2000). Saguaro National Park has extensive documentation of roadkill (Kline and Swann 1998); however, no formal roadkill data exist for the roads in TMP.

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Water Resources

There are no natural perennial resources for wildlife at TMP. However, perennial water catchments (i.e., guzzlers) were developed in association with the Central Arizona Tucson Aqueduct project that was constructed in the early 1980s. Within the WMC, there is one source that is plumbed from the aqueduct and another that is pumped from a well. In addition, there are seven other perennial water catchments located within TMP (Krausman 1998). The locations of the catchments were chosen based on known movement patterns of wildlife. They facilitate movement between the Tucson Mountains and the Ironwood Forest National Monument and the Roskrige Mountains to the west (See Figure 7-C). Wildlife crossings in the WMC adjacent to catchments were found to have higher use by herbivores than crossings without wildlife water sources (Popowski and Krausman 2002).

Boundary issues

Except for the northern boundary which is shared by Saguaro National Park, Tucson Mountain Park is becoming increasingly enveloped by residential development. The actions of TMP's neighbors affect the wildlife not only at the park boundary, but in some instances are capable of reaching far into the park.

Domestic and native pets can both have negative impacts on native wildlife populations. The direct impacts of wildlife predation by domestic dogs and cats, as well as harassment and habitat destruction (e.g., dogs digging in burrows) are well documented (Jurek 1994). It has been estimated that house cats are responsible for killing more than a billion small mammals and hundreds of millions of songbirds each year in North America (USFWS Bird Mortality Factsheet, <http://www.fws.gov/birds/mortality-fact-sheet.pdf>, assessed May 2007). In addition, reptile populations suffer from genetic contamination and disease as a result of the release of animals (native and non-native) that had been kept as pets. Desert tortoises and gila monsters are particularly prone to these impacts. For example, in the Mojave Desert, a catastrophic epidemic of upper respiratory tract disease (URTD) in desert tortoises was introduced by released native and non-native pet tortoises (Jacobson 1993).

Residents of communities that share a border with TMP often find enjoyment in feeding wildlife. This activity can have unintended effects that are deleterious to both wildlife and public safety, including acclimation of animals to humans and aggressive behavior. In 2006, the Arizona legislature passed a "no feeding wildlife" law, making it illegal to feed wildlife (except birds and tree squirrels) in Pima and Maricopa counties.

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Proximity to residential development generally increases a variety of additional negative impacts to wildlife including poaching of animal materials, theft of boulders that provide habitat, invasion of non-native species such as buffelgrass and red brome (*Bromus rubens*) that encourage desert wildfires, and social and wildcat trail-blazing that increase the likelihood of wildlife disturbance.

Lack of Baseline Information and Monitoring

The basis of any adaptive resource management plan is an understanding of baseline conditions, including basic inventory and monitoring information. The wildlife resources of TMP require thorough documentation so that the direct and indirect impacts of increasing urbanization, climate change, and non-native species invasion can be analyzed and appropriate management actions taken.

Because there has been extensive development and implementation of inventory and monitoring protocols at Saguaro National Park (Powell et al. 2006), TMP has an excellent framework to build from.

Pima County is in the initial stages of development of its Ecological Effectiveness Monitoring Program (Pima County 2007), which is a required element of the Pima County Multi-Species Conservation Plan. The Pima County EEMP is proposed to be a landscape level monitoring plan which will track a broad suite of biotic and abiotic parameters, including vertebrate species and communities. TMP will likely be an important participant in this program once it is established.

NOTE:

Figure 7-B: Mine Shafts in Tucson Mountain Park, is not included in this report. Copies of this figure are on file with the Pima County Natural Resources, Parks and Recreation Department.

7. Biological Resources - Wildlife

NOTE:

Figure 7-C: Wildlife Guzzlers in Tucson Mountain Park, is not included in this report. Copies of this figure are on file with the Pima County Natural Resources, Parks and Recreation Department.

8.1 Project Area Location and Description:

Tucson Mountain Park encompasses approximately 18,750 acres, but the project area also includes four sections on the western boundary of the park that are Bureau of Reclamation wildlife mitigation corridor property managed as part of Tucson Mountain Park. In addition, the current project area includes two Bureau of Land Management annex parcels located on the southern side of the park, and the proposed Robles Pass addition located on the southeastern boundary of the park (Figure 8-A). The total project area discussed in this report is approximately 23,570 acres.

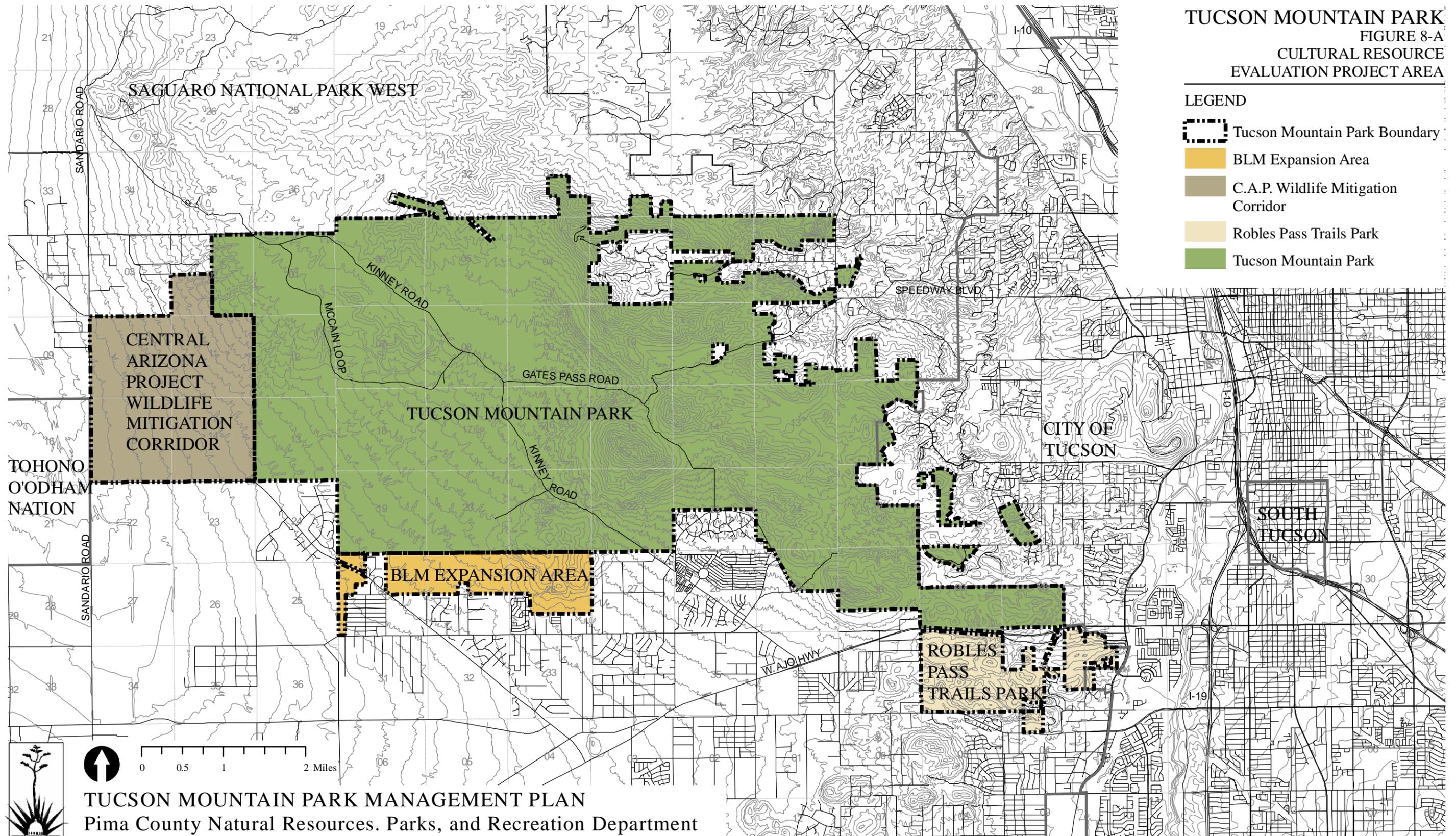
The project area is composed of all or part of the following: Sections 1, 2, 10, 11, 12, 13, 14, and 15 of Township 14 South, Range 11 East, on 7.5-minute USGS topographic quad Brown Mountain, AZ, (AZ AA:16 [NW]); Sections 4, 5, 6, 7, 8, 9, 16, 17, 18, 19, 20, and 21 of Township 14 South, Range 12 East, on 7.5-minute USGS topographic quad Brown Mountain, AZ, (AZ AA:16 [NW]); Sections 1, 2, 3, 4, 7, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 21, 22, 23, 24, 25, 28, 29, 30, 32, and 33 of Township 14 South, Range 12 East, on USGS 7.5-minute topographic quad Cat Mountain, AZ, (AZ AA:16 [NE]); Sections 33 and 34 of Township 13 South, Range 12 East, on 7.5-minute USGS topographic quad Jaynes, AZ, (AZ AA:12 [SE]); and Sections 31 and 32 in Township 13 South, Range 12 East, on 7.5-minute USGS topographic quad Avra, AZ, (AZ AA:12 [SW]).

This Class I inventory has been prepared as part of a Management Master Plan to enable the Pima Country Natural Resources, Parks, and Recreation Department to effectively manage and preserve the cultural properties within the project area. The Management Master Plan will bring Tucson Mountain Park into compliance with state and federal laws, regulations, and guidelines that regulate cultural, historical, and archaeological properties located on public lands. These laws are summarized in Table 8-1.

TUCSON MOUNTAIN PARK
FIGURE 8-A
CULTURAL RESOURCE
EVALUATION PROJECT AREA

LEGEND

-  Tucson Mountain Park Boundary
-  BLM Expansion Area
-  C.A.P. Wildlife Mitigation Corridor
-  Robles Pass Trails Park
-  Tucson Mountain Park



0 0.5 1 2 Miles

TUCSON MOUNTAIN PARK MANAGEMENT PLAN
 Pima County Natural Resources, Parks, and Recreation Department

Prepared by McGann & Associates Landscape Architects and Planners

Table 8-1. Laws, regulations, and guidelines concerning cultural and historical properties.

Federal Laws:

Antiquities Act of 1906 (16 USC 431-433)

Historic Sites, Buildings, Objects, and Antiquities Act of 1935 (16 USC 461-467)

National Historic Preservation Act of 1966 (as amended; 16 USC 470 et seq.) (NHPA)

National Environmental Policy Act of 1969 (42 USC 4321) (NEPA)

Archeological and Historic Preservation Act of 1974 (16 USC 469-469c) (AHPA)

American Indian Religious Freedom Act of 1978 (42 USC 1996) (AIRFA)

Archeological Resources Protection Act of 1979 (as amended; 16 USC 470aa-mm) (ARPA)

Native American Graves Protection and Repatriation Act of 1990 (as amended; 25 USC 3001-3013) (NAGPRA)

Regulations:

National Register of Historic Places (36 CFR Part 60)

Determinations of Eligibility for Inclusion in the National Register of Historic Places (36 CFR Part 63)

National Historic Landmarks Program (36 CFR Part 65)

Protection of Historic Properties (36 CFR Part 800)

Protection of Archeological Resources (43 CFR Part 7)

Native American Graves Protection & Repatriation Act: Final Rule (43 CFR Part 10)

Section 106 of the National Historic Preservation Act (36 CFR Part 800)

Section 110 of the National Historic Preservation Act (16 USC 470h)

Guidelines:

The Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation

The Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR 68)

The Secretary of the Interior's Standards and Guidelines for Architectural and Engineering Documentation:

HABS/HAER Standards

The Secretary of the Interior's Professional Qualification Standards (48 FR 22716, Sept. 1983)

Confidentiality of Archaeological Resource Information (CFR 7.18)

Confidentiality of Information Concerning Nature and Location of Archaeological Resources (16 USC 470hh)

Arizona Laws:

Arizona Antiquities Act of 1960 (A.R.S. 15-1631 and 41-841)

Arizona State Historic Preservation Act of 1982

Arizona State Burial Act 1990

Pima County Guidelines:

Pima County Board of Supervisors Resolution 1983-104

Pima County Comprehensive Plan 2002

8.2 Environmental Setting of the Project Area:

Tucson Mountain Park is a large expanse of land located west of the City of Tucson, and currently encompasses approximately 18,750 acres. The park is defined by the Tucson Mountains on its eastern end, but also includes the bajada of the Avra Valley on its western end. The Tucson Mountains are the remains of a volcanic caldera 25 km long that has erupted several times in the geologic past, most notably 70 million years ago. That eruption sent volcanic debris across the Tucson Basin and contributed to the formation of some natural resources, such as basalt, prized by people for thousands of years as prime stone tool material (Kring 2002).

The oldest sediments in the Tucson Mountains, the Amole Arkose Formation, are the remains of freshwater marine mollusks from the Bisbee Group that accumulated during the lower Cretaceous, 145-99 million years ago (Kring 2002). Amole Lake covered a large area, including what is now Avra Valley and the western flanks of the Tucson Mountains. It was a large lake, up to 80 m (260 ft) deep, that drained towards the Gulf of Mexico via the Bisbee Basin. Fossilized wood fragments, and fossil mollusks and fish have been found in the siltstone and mudstones that make up the Formation. However, these are few in number and provide an incomplete picture of the environment at the time. A small number of various dinosaur remains found in other southern Arizona mountains, such as the Santa Rita Mountains, suggest that hadrosaurs and sauropods likely lived in the area.

Volcanic activity characterized the subsequent period, and a large volcanic field, of which the Tucson Mountains Volcanic Caldera was a part, formed in southern Arizona. A rapid series of lava flows occurred, evidence for which can be found in the Silver Bell Mountains, 30 km (18 miles) north of the Tucson Mountains. A series of volcanic eruptions deposited thick lava and ash flows. The ash flow tuffs contained a variety of minerals, dominated by quartz, feldspar, and biotite. Some of these flows were very hot and created a very hard rock; some of the flows were cooler, and created tuffs that easily erode compared to the harder materials around them formed during hotter flows. The floor of the caldera subsided and collapsed, although not uniformly, as the variable thickness of the breccias and ash deposits indicate--the northern end of the caldera has much thicker deposits than the southern end. Volcanic vents continued to spew materials that filled the caldera. A large volume of granitic magma, known as a pluton, intruded along a fracture on the northwestern side of the caldera. This produced uplift that tilted the lava flows and sediments. The caldera cycle has been estimated to have lasted 1 million years (Kring 2002), and was followed by a geologically quieter time during which erosion began to shape the landscape. A second cycle of volcanic eruptions occurred 40 to 45 million years later, but these were much smaller in scale. These occurred 25 to 30 million years ago (Lipman 1993), and are exposed today in Tumamoc Hill and Sentinel Peak. The chemical composition of these flows was different from the preceding caldera cycle eruptions, and contained basaltic andesite compositions and the mineral olivine, which was quarried and used for building material on the University of Arizona and in many downtown area homes of the early twentieth century.

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This brief history of the formation of the Tucson Mountains has been provided to illustrate why the Tucson Mountains were important in the past: certain mineral deposits and rock formations were present in the mountains which were very desirable to people living in the Tucson Basin. These include copper, gold, and silver, as well as garnets, hematite, and magnetite. Additional materials mined in the Tucson Mountains were galena, pyrite, malachite, quartz, vanadinite, wulfenite, and more than a dozen other, less familiar, minerals. In prehistoric times, the rhyolite, basalt, and quartz were very desirable materials for flaked stone and ground stone tools used for hunting, food processing, and other activities, and was, perhaps, traded extensively. Mano and metate fragments made from vesicular basalt are found in the eastern Tucson Basin, and may originate from these formations.

The project area is located in the Arizona Upland Sonoran Desertscrub biome (Brown 1994), and its present distribution dates to 8,000-9,000 years ago. It is characterized by a bimodal rainfall pattern, with high-energy monsoon flows in the summer and gentler winter rains. Cacti are the dominant flora, and cholla (*Opuntia* sp.), prickly pear (*Opuntia engelmannii*), and saguaro (*Carnegiea gigantea*) create the unique forest for which the Tucson Mountains are known. The Upland division contacts with the Lower Colorado River Valley subdivision along its western edge, and this includes the Avra Valley. The Lower Colorado River Valley subdivision is differentiated from the Arizona Upland Sonoran Desertscrub biome by the latter's higher summer rainfall and winter temperature minima. The Lower Colorado River Valley biome is the driest of the Sonora Desert subdivisions, and scarce water resources minimize vegetation. The eastern Avra Valley, bordering the project area, exemplifies the dendritic pattern of drainage found in parts of the Lower Colorado River Valley subdivision, with numerous tributaries converging into a definite course that carries runoff to a regional drainage; here, Brawley Wash flows north into the Santa Cruz River. Small trees and shrubs are found only on the banks of these tributaries, including mesquite (*Prosopis* sp.), ironwood (*Olneya tesota*), and blue paloverde (*Cercidium floridum*). Foothills paloverde (*Cercidium microphyllum*), burroweed (*Isocoma tenuisecta*), creosotebush (*Larrea tridentata*) and other small shrubs are also present. Prehistoric and historic-era occupations in the project area thus had a wide variety of floral, and accompanying faunal, resources to use that were available in a relatively small area.

Elevations within the park range from 1,340 m (4,395 ft) above sea level at the park's highest point within the Tucson Mountains, to 731 m (approximately 2,400 ft) at its southwestern boundary. The ecological diversity reflected by these elevation ranges was utilized in prehistory for the extraction of raw materials such as chert, basalt, and other materials for stone tools, and variable plant and animal resources. Since the early twentieth century, the park has functioned as a prime recreational destination for local Tucsonans and visitors, providing the opportunity for all to enjoy settings as diverse as saguaro forests and desert areas and easily accessible mountain peaks with outstanding views of the Tucson and Avra valleys.

Numerous seasonal washes flow east out of the Tucson Mountains towards the Santa Cruz River, which at its nearest reach is less than 3 miles east of the southwestern corner of the park. Seasonal washes on the western flank of the Tucson Mountains flow west towards the Brawley Wash system.

8.3 Cultural Background of the Project Area:

The history of the Southwest and of the Tucson Basin is marked by a close relationship between people and the natural environment. Environmental conditions have strongly influenced subsistence practices and social organization, and social and cultural changes have, in turn, made it possible to more efficiently exploit environmental resources. Through time, specialized adaptations to the arid region distinguished people living in the Southwest from those in other areas. Development of cultural and social conventions also became more regionally specific, and by A.D. 650, groups living in the Tucson Basin can be readily differentiated from those living in other areas of the Southwest. Today, the harsh desert climate no longer isolates Tucson and its inhabitants, but life remains closely tied to the unique resources of the Southwest. The chronology of the Tucson Basin is summarized in Table 8-2.

Table 8-2. Periodization and chronology of the Santa Cruz Valley-Tucson Basin prehistory.

Periods	Phases	Date Ranges
Historic		
American Statehood		A.D. 1912-present
American Territorial		A.D. 1856-1912
Spanish and Mexican		A.D. 1697-1856
Protohistoric		A.D. 1450-1697
Hohokam Classic	Tucson	A.D. 1300-1450
	Tanque Verde	A.D. 1150-1300
Hohokam Sedentary	Late Rincon	A.D. 1100-1150
	Middle Rincon	A.D. 1000-1100
	Early Rincon	A.D. 950-1000
Hohokam Colonial	Rillito	A.D. 850-950
	Cañada del Oro	A.D. 750-850
Hohokam Pioneer	Snaketown	A.D. 650/700-750
	Tortolita	A.D. 500-650/700
Early Ceramic	Late Agua Caliente	A.D. 350-500
	Early Agua Caliente	A.D. 50-350
Early Agricultural	Late Cienega	400 B.C.-A.D. 50
	Early Cienega	800-400 B.C.
	San Pedro	1200-800 B.C.
	(Unnamed)	2100-1200 B.C.
Archaic	Chiricahua	3500-2100 B.C.
	(Occupation gap?)	6500-3500 B.C.
	Sulphur Springs-Ventana	7500-6500 B.C.
Paleoindian		11,500?-7500 B.C.

Paleoindian Period (11,500?-7500 B.C.)

Archaeological investigations suggest the Tucson Basin was initially occupied some 13,000 years ago, a time much wetter and cooler than today. The Paleoindian period is characterized by small, mobile groups of hunter-gatherers who briefly occupied temporary campsites as they moved across the countryside in search of food and other resources (Cordell 1997:67). The hunting of large mammals, such as mammoth and bison, was a particular focus of the subsistence economy. A Clovis point characteristic of the Paleoindian period (circa 9500 B.C.) was collected from the Valencia site, located along the Santa Cruz River in the southern Tucson Basin (Doelle 1985:183-184). Another Paleoindian point was found in Rattlesnake Pass, in the northern Tucson Basin (Huckell 1982). These rare finds suggest prehistoric use of the Tucson area probably began at this time. Paleoindian use of the Tucson Basin is supported by archaeological investigations in the nearby San Pedro Valley and elsewhere in southern Arizona, where Clovis points have been discovered in association with extinct mammoth and bison remains (Huckell 1993, 1995). However, because Paleoindian sites have yet to be found in the Tucson Basin, the extent and intensity of this occupation are unknown.

Archaic Period (7500-2100 B.C.)

The transition from the Paleoindian period to the Archaic period was accompanied by marked climatic changes. During this time, the environment came to look much like it does today. Archaic period groups pursued a mixed subsistence strategy, characterized by intensive wild plant gathering and the hunting of small animals. The only Early Archaic period (7500-6500 B.C.) site known from the Tucson Basin is found in Ruelas Canyon, south of the Tortolita Mountains (Swartz 1998:24). However, Middle Archaic period sites dating between 3500 and 2100 B.C. are known from the bajada zone surrounding Tucson, and, to a lesser extent, from floodplain and mountain areas. Investigations conducted at Middle Archaic period sites include excavations along the Santa Cruz River (Gregory ed. 1999), in the northern Tucson Basin (Roth 1989), at the La Paloma development (Dart 1986), and along Ventana Canyon Wash and Sabino Creek (Dart 1984; Douglas and Craig 1986). Archaic period sites in the Santa Cruz floodplain were found to be deeply buried by alluvial sediments, suggesting more of these sites are present, but undiscovered, due to the lack of surface evidence.

Early Agricultural Period (2100 B.C.-A.D. 50)

The Early Agricultural period (previously identified as the Late Archaic period) was the period when domesticated plant species were first cultivated in the Greater Southwest. The precise timing of the introduction of cultigens from Mexico is not known, although direct radiocarbon dates on maize indicate it was being cultivated in the Tucson Basin and several other parts of the Southwest by 2100 B.C. (Mabry 2006). By at least 400 B.C., groups were living in substantial

8. Cultural Resources

agricultural settlements in the floodplain of the Santa Cruz River. Recent archaeological investigations suggest canal irrigation also began sometime during this period.

Several Early Agricultural period sites are known from the Tucson Basin and its vicinity (Diehl 1997; Ezzo and Deaver 1998; Freeman 1998; Gregory ed. 2001; Huckell and Huckell 1984; Huckell et al. 1995; Mabry 1998, 2005; Roth 1989). While there is variability among these sites-probably due to the 2,150 years included in the period-all excavated sites to date contain small, round, or oval semisubterranean pithouses, many with large internal storage pits. At some sites, a larger round structure is also present, which is thought to be for communal or ritual purposes.

Stylistically distinctive Cienega, Cortaro, and San Pedro type projectile points are common at Early Agricultural sites, as are a range of ground stone and flaked stone tools, ornaments, and shell jewelry (Diehl 1997; Mabry 1998). The fact that shell and some of the material used for stone tools and ornaments were not locally available in the Tucson area suggests trade networks were operating. Agriculture, particularly the cultivation of corn, was important in the diet and increased in importance through time. However, gathered wild plants-such as tansy mustard and amaranth seeds, mesquite seeds and pods, and agave hearts-were also frequently used resources. As in the preceding Archaic period, the hunting of animals such as deer, cottontail rabbits, and jackrabbits, continued to provide an important source of protein.

Early Ceramic Period (A.D. 50-500)

Although ceramic artifacts, including figurines and crude pottery, were first produced in the Tucson Basin during the Early Agricultural period (Heidke and Ferg 2001; Heidke et al. 1998), the widespread use of ceramic containers marks the transition to the Early Ceramic period (Huckell 1993). Undecorated plain ware pottery was widely used in the Tucson Basin by about A.D. 50, marking the start of the early Agua Caliente phase (A.D. 50-350).

Architectural features became more formalized and substantial during the Early Ceramic period, representing a greater investment of effort in construction, and perhaps more permanent settlement. A number of pithouse styles are present, including small, round, and basin-shaped houses, as well as slightly larger subrectangular structures. As during the Early Agricultural period, a class of significantly larger structures may have functioned in a communal or ritual manner.

Reliance on agricultural crops continued to increase, and a wide variety of cultigens-including maize, beans, squash, cotton, and agave-were an integral part of the subsistence economy. Populations grew as farmers expanded their crop production to floodplain land near permanently flowing streams, and it is assumed that canal irrigation systems also expanded. Evidence from archaeological excavations indicates trade in shell, turquoise, obsidian, and other materials intensified and that new trade networks developed.

Hohokam Sequence (A.D. 500-1450)

The Hohokam tradition developed in the deserts of central and southern Arizona sometime around A.D. 500 and is characterized by the introduction of red ware and decorated ceramics: red-on-buff wares in the Phoenix Basin and red-on-brown wares in the Tucson Basin (Doyel 1991; Wallace et al. 1995). Red ware pottery was introduced to the ceramic assemblage during the Tortolita phase (A.D. 500-650/700). The addition of a number of new vessel forms suggests that, by this time, ceramics were utilized for a multitude of purposes.

Through time, Hohokam artisans embellished this pottery with highly distinctive geometric figures and life forms such as birds, humans, and reptiles. The Hohokam diverged from the preceding periods in a number of other important ways: (1) pithouses were clustered into formalized courtyard groups, which, in turn, were organized into larger village segments, each with their own roasting area and cemetery; (2) new burial practices appeared (cremation instead of inhumation) in conjunction with special artifacts associated with death rituals; (3) canal irrigation systems were expanded and, particularly in the Phoenix Basin, represented huge investments of organized labor and time; and (4) large communal or ritual features, such as ballcourts and platform mounds, were constructed at many village sites.

The Hohokam sequence is divided into the pre-Classic (A.D. 500-1150) and Classic (A.D. 1150-1450) periods. At the start of the pre-Classic, small pithouse hamlets and villages were clustered around the Santa Cruz River. However, beginning about A.D. 750, large, nucleated villages were established along the river or its major tributaries, with smaller settlements in outlying areas serving as seasonal camps for functionally specific tasks such as hunting, gathering, or limited agriculture (Doelle and Wallace 1991). At this time, large, basin-shaped features with earthen embankments, called ballcourts, were constructed at a number of the riverine villages. Although the exact function of these features is unknown, they probably served as arenas for playing a type of ball game, as well as places for holding religious ceremonies and for bringing different groups together for trade and other communal purposes (Wilcox 1991; Wilcox and Sternberg 1983).

Between A.D. 950 and 1150, Hohokam settlement in the Tucson area became even more dispersed, with people utilizing the extensive bajada zone as well as the valley floor (Doelle and Wallace 1986). An increase in population is apparent, and both functionally specific seasonal sites, as well as more permanent habitations, were now situated away from the river; however, the largest sites were still on the terraces just above the Santa Cruz. There is strong archaeological evidence for increasing specialization in ceramic manufacture at this time, with some village sites producing decorated red-on-brown ceramics for trade throughout the Tucson area (Harry 1995; Heidke 1988, 1996; Huntington 1986).

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The Classic period is marked by dramatic changes in settlement patterns and possibly in social organization. Aboveground adobe compound architecture appeared for the first time, supplementing, but not replacing, the traditional semisubterranean pithouse architecture (Haury 1928; Wallace 1995). Although corn agriculture was still the primary subsistence focus, extremely large Classic period rock pile field systems associated with the cultivation of agave have been found in both the northern and southern portions of the Tucson Basin (Doelle and Wallace 1991; Fish et al. 1992).

Platform mounds were also constructed at a number of Tucson Basin villages sometime around A.D. 1275-1300 (Gabel 1931). These features are found throughout southern and central Arizona and consist of a central structure that was deliberately filled to support an elevated room upon a platform. The function of the elevated room is unclear; some were undoubtedly used for habitation, whereas others may have been primarily ceremonial. Building a platform mound took organized and directed labor, and the mounds are believed to be symbols of a socially differentiated society (Doelle et al. 1995; Elson 1998; Fish et al. 1992; Gregory 1987). By the time platform mounds were constructed, most smaller sites had been abandoned, and Tucson Basin settlement was largely concentrated at only a half-dozen large, aggregated communities. Recent research has suggested that aggregation and abandonment in the Tucson area may be related to an increase in conflict and possibly warfare (Wallace and Doelle 1998). By A.D. 1450, the Hohokam tradition, as presently known, disappeared from the archaeological record.

Protohistoric Period (A.D. 1450-1697)

Little is known of the period from A.D. 1450, when the Hohokam disappeared from view, to A.D. 1697, when Father Kino first traveled to the Tucson Basin (Doelle and Wallace 1990). By that time, the Tohono O'odham people were living in the arid desert regions west of the Santa Cruz River, and groups that lived in the San Pedro and Santa Cruz valleys were known as the Sobaipuri (Doelle and Wallace 1990; Masse 1981). Both groups spoke the O'odham language and, according to historic accounts and archaeological investigations, lived in oval jacal surface dwellings rather than pithouses. One of the larger Sobaipuri communities was located at Bac, where the Spanish Jesuits, and later the Franciscans, constructed the mission of San Xavier del Bac (Huckell 1993; Ravesloot 1987). However, due to the paucity of historic documents and archaeological research, little can be said regarding this inadequately understood period.

Spanish and Mexican Periods (A.D. 1697-1856)

Spanish exploration of southern Arizona began at the end of the seventeenth century A.D. Early Spanish explorers in the Southwest noted the presence of Native Americans living in what is now the Tucson area. These groups comprised the largest concentration of population in southern Arizona (Doelle and Wallace 1990). In 1757, Father Bernard Middendorf arrived in the Tucson area, establishing the first local Spanish presence. Fifteen years later, the construction

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of the San Agustín Mission near a Native American village at the base of A-Mountain was initiated, and by 1773, a church was completed (Dobyns 1976:33).

In 1775, the site for the Presidio of Tucson was selected on the eastern margin of the Santa Cruz River floodplain. In 1776, Spanish soldiers from the older presidio at Tubac moved north to Tucson, and construction of defensive and residential structures began. The Presidio of Tucson was one of several forts built to counter the threat of Apache raiding groups who had entered the region at about the same time as the Spanish (Thiel et al. 1995; Wilcox 1981). Spanish colonists soon arrived to farm the relatively lush banks of the Santa Cruz River, to mine the surrounding hills, and to graze cattle. Many indigenous settlers were attracted to the area by the availability of Spanish products and the relative safety provided by the Presidio. The Spanish and Native American farmers grew corn, wheat, and vegetables, and cultivated fruit orchards, and the San Agustín Mission was known for its impressive gardens (Williams 1986).

In 1821, Mexico gained independence from Spain, and Mexican settlers continued farming, ranching, and mining activities in the Tucson Basin. By 1831, the San Agustín Mission had been abandoned (Elson and Doelle 1987; Hard and Doelle 1978), although settlers continued to seek the protection of the Presidio walls.

American Period (1856-Present)

Through the 1848 settlement of the Mexican-American War and the 1853 Gadsden Purchase, Mexico ceded much of the Greater Southwest to the United States, establishing the international boundary at its present location. The U.S. Army established its first outpost in Tucson in 1856 and, in 1873, founded Fort Lowell at the confluence of the Tanque Verde Creek and Pantano Wash, to guard against continued Apache raiding.

Railroads arrived in Tucson and the surrounding areas in the 1880s, opening the floodgates of Anglo-American settlement. With the surrender of Geronimo in 1886, Apache raiding ended, and the region's settlement boomed. Local industries associated with mining and manufacturing continued to fuel growth, and the railroad supplied the Santa Cruz River valley with the commodities it could not produce locally. Meanwhile, homesteaders established numerous cattle ranches in outlying areas, bringing additional residents and income to the area (Mabry et al. 1994).

By the turn of the twentieth century, municipal improvements to water and sewer service, and the eventual introduction of electricity, made life in southern Arizona more hospitable. New residences and businesses continued to appear within an ever-widening perimeter around Tucson, and city limits stretched to accommodate the growing population. Tourism, the health industry, and activities centered around the University of Arizona and Davis-Monthan Air Force Base have contributed significantly to growth and development in the Tucson Basin in the twentieth century (Sonnichsen 1982).

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8.4 History of the Project Area:

The project area is located on the western side of the Santa Cruz River. Native populations have lived in the area for thousands of years, although the history of Euro-American presence in the area is much more brief. Like the Native People before them, Mexican and Euro-American explorers recognized the rich resources present in the Tucson Mountains, and the earliest modern settlement of the area was divided between ranches and homesteads and mining operations. Table 8-3 summarizes patent titles granted for land within the many sections that comprise the project area.

Many of the titles were issued to homesteaders in the early twentieth century. Preliminary archival research into the various mining companies that patented titles did not uncover much information, and these mines may not have existed anywhere except on paper. However, further archival research, as well as archaeological survey, is needed, and may uncover additional evidence on these mining companies.

Table 8-3. Land patent summary for sections within Tucson Mountain Park (acquisition information has been consolidated).

Township 14 South, Range 11 East				
Sect. No.	Year	Patentee	Statute	Aliquot Parts
1	1943	State of Arizona	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	SE1/4, S1/2 NE1/4 NE1/4, portion of Ne1/4 NE1/4, portion of NW1/4 NE1/4
	1966	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	SW1/4, SW1/4 NW1/4, portion of NE1/4 NW1/4, portion of NW1/4 NW1/4
2	1910	State of Arizona	Arizona Enabling Act (36 Stat. 557; June 20, 1910)	entire section
10	1958	State of Arizona	Indemnity Selections (44 Stat. 1022; January 21, 1927)	entire section
11	1958	State of Arizona	Indemnity Selections (44 Stat. 1022; January 21, 1927)	entire section
12	1971	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	entire section
13	1956	Pima County	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	entire section
14	1936	State of Arizona	Indemnity Selections (44 Stat. 1022; January 21, 1927)	N1/2, NE1/4 SE1/4
	1958	State of Arizona	Indemnity Selections (44 Stat. 1022; January 21, 1927)	SW, W1/2 SE, SE1/4 SE1/4
15	1936	State of Arizona	Indemnity Selections (44 Stat. 1022; January 21, 1927)	NE
	1958	State of Arizona	Indemnity Selections (44 Stat. 1022; 1/21/27)	W1/2, SE

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Table 8-3. Continued

Township 14 South, Range 12 East				
Sect.	Year	Patentee	Statute	Aliquot Parts
1	1930	Robert M. Riddell	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	S1/2 N1/2, NE1/4 NE1/4, NW1/4 NE1/4, NE1/4 NW1/4, NW1/4 NW 1/4
	1930	Harry P. Warren	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	S1/2
2	1910	State of Arizona	Arizona Enabling Act (36 Stat. 557; June 20, 1910)	S 1/2, S1/2 N1/2, NE1/4 NE1/4, NW1/4 NE1/4, NE1/4 NW1/4
3	1932	Joseph I. Conniff	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	N1/2, N1/2 SW1/4, S1/2 SE 1/4
	1956	Perley M. Lewis	Exchange-Private-Taylor Act (48 Stat. 1269; June 28, 1934)	SW1/4 SW 1/4
4	1934	Antonio Lerua	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	NW 1/4, SW 1/4
	1956	Perley M. Lewis	Exchange-Private-Taylor Act (48 Stat. 1269; June 28, 1934)	NE 1/4, SE 1/4
5	1872	James Lee, William F. Scott	Mineral Patent-Lode (14 Stat. 251; July 26, 1866)	entire section
	1882	Silver Moon Mining Co.	Mineral Patent-Lode (14 Stat. 251; July 26, 1866)	entire section
	1883	Silver Moon Mining Co.	Mineral Patent-Lode (14 Stat. 251; July 26, 1866)	entire section
	1884	Santa Rita Land and Mining Co.	Mineral Patent-Lode (14 Stat. 251; July 26, 1866)	entire section
	1885	Silver Moon Mining Co.	Mineral Patent-Lode (14 Stat. 251; July 26, 1866)	entire section
	1964	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	near entire section
6	1884	Santa Rita Land and Mining Co.	Mineral Patent-Lode (14 Stat. 251; July 26, 1866)	entire section
	1885	Silver Moon Mining Co.	Mineral Patent-Lode (14 Stat. 251; July 26, 1866)	entire section
	1961	Pima County Board of Supervisors	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	S1/2 SE
	1933	Pima County	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	SW1/4 NW 1/4
	1967	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	NE, N1/2 SE 1/4
	1943	State of Arizona	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	portions of NW 1/4, portions of SW 1/4
7	1961	Pima County Board of Supervisors	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	portion of SW1/4
	1963	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	E1/2 W1/2, W 1/2 E1/2, portions of NW1/4, portion of SW1/4
	1964	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	portion of NE1/4 SE1/4

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Table 8-3. Continued.

Township 14 South, Range 12 East				
Sect. No.	Year	Patentee	Statute	Aliquot Parts
8	1971	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	entire section
9	1971	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	entire section
10	1970	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	entire section
11	1932	Charles W. Kelly	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	entire section
12	1930	Harry P. Warren	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	N1/2 NE
	1930	Robert M. Riddell	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	NW, S1/2 NE, NE1/4 SE1/4
	1932	James R. Hubbard	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	SW, W1/2 SE, SE 1/4 SE 1/4
13	1932	James R. Hubbard	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	NW, N1/2 NE
	1935	Sherry Bowen	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	S1/2 NE, SE, E1/2 SW
	1937	Ida A. Libbey, Jason M. Libbey	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	W1/2 SW
14	1932	James R. Hubbard	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	E1/2 NE
	1937	Ida A. Libbey, Jason M. Libbey	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	NE, SW, SE, W1/2 NE
15	1969	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	entire section
16	1920	State of Arizona	Arizona Enabling Act (36 Stat. 557; June 20, 1910)	E1/2, S1/2 NW, N1/2 SW, SE1/4 SW1/4
17	1936	County of Pima	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	NW
	1943	State of Arizona	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	E1/2
	1961	Pima County Board of Supervisors	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	SW
18	1958	Pima County Board of Supervisors	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	E1/2, E1/2 W1/2, portions of NW1/4
	1961	Pima County Board of Supervisors	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	portions of NW1/4
19	1963	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	portion of NW1/4 NW1/4
	1965	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	E1/2, E1/2 W1/2, portions of NW1/4
	1967	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	portions of SW1/4 NW1/4 and of SW1/4
20	1968	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	S1/2
	1971	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	N1/2

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Table 8-3. Continued

Township 14 South, Range 12 East				
Sect. No.	Year	Patentee	Statute	Aliquot Parts
21	1967	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	S1/2 NE, S1/2 NW
	1971	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	S1/2
22	1939	Sherry Bowen	Sale-Cash Entry (3 Stat. 566; April 24, 1820)	NE1/4 NE1/4, S1/2 NE1/4
	1961	Pima County Board of Supervisors	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	SE1/4
	1966	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	W 1/2
	1967	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	NW 1/4 NE1/4
23	1932	Henry H. Kelley	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	S1/2
	1933	Edmond H. Bayse	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	E1/2 NE
	1972	State of Arizona	Indemnity Selections (44 Stat. 1020; January 21, 1927)	N1/2 NW1/4, SW1/4 NW1/4, portion of NE1/4 NW1/4
	1974	Pima County Parks and Rec. Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	portions of SW1/4 NW1/4
	1981	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	portion of SW 1/4 NE1/4
24	1933	Edmond H. Bayse	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	NE, E1/2 NW
	1943	Sherry Bowen	Exchange-Private-Taylor Act (48 Stat. 1269; June 28, 1934)	E1/2 SE
	1956	Perley M. Lewis	Exchange-Private-Taylor Act (48 Stat. 1269; June 28, 1934)	W 1/2 NW
	1962	Pima County School District Number 1	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	portion of SW1/4 SW1/4
	1963	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	portion of SW1/4 SW1/4
	1972	State of Arizona	Indemnity Selections (44 Stat. 1020; January 21, 1927)	N1/2 SW, W1/2 SE
	1974	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	portion of SW 1/4 SW 1/4
25	1934	Paul V. Merriman	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	NW 1/4
	1950	State of Arizona	Exchange-Taylor Act (48 Stat. 1269; June 28, 1934)	NE 1/4
	1970	Catalina Council Boy Scouts of America	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	SE1/4, NW1/4 SW1/4, SW 1/4 SW 1/4, SE1/4 SW1/4, portion of the NE1/4 SW1/4
	1980	Catalina Council Boy Scouts of America	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	portion of the NE1/4 SW 1/4
28	1933	Oscar L. Sturm, Mazie Sturm	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	NW 1/4 SW 1/4, S1/2 S1/2
	1983	I. Bopp Properties	Sale-Sec 209 Minerals-FLPMA (90 Stat. 2743; October 21, 1976)	portion of SW

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Table 8-3. Continued

Township 14 South, Range 12 East				
Sect. No.	Year	Patentee	Statute	Aliquot Parts
29	1957	Stella I. Keogh	NA: Sale-Title 32 Chapter 7 (RS 2353 43 USC 672)	S1/2
	1981	Tucson Unified School District No. 1	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	portion of SE1/4 NW1/4
30	1933	Edmond H. Bayse	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	SE, E1/2 NW1/4
	1936	Ezra E. Heller	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	E1/ SW, portion of NW1/4 SW1/4, portion of SE1/4 SW1/4
	1981	Tucson Unified School District No. 1	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	portions of SW1/4 NW 1/4
Township 14 South, Range 13 East				
Sect. No.	Year	Patentee	Statute	Aliquot Parts
7	1923	Ben Henry Anderson	Homestead Entry-Original (12 Stat. 392); May 20, 1862	SW1/4 S1/4
	1931	Herbert C. Jensen	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	N1/2 NE, SW1/4 NE1/4, SE1/4 NW1/4
	1933	Alice Vail	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	SE1/4 NE1/4
	1935	John D. McRae	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	E1/2 SW, portion of SW1/4 SW1/4
	1936	Grady S. McRae	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	N1/2 SE, SW1/4 SE1/4
	1939	J. Ralph Anklam	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	SE1/4 SE1/4
18	1881	Louis C. Hughes	Mineral Patent-Lode (14 Stat. 251; July 26, 1866)	entire section
	1913	Old Pueblo Copper Co.	Mineral Patent-Lode (14 Stat. 251; July 26, 1866)	entire section
	1932	W. Fred Kain	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	SW1/4 SE1/4
	1932	James R. Hubbard	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	NW1/4 NW1/4
	1939	J. Ralph Anklam	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	NE, N1/2 SE, SE1/4 SE1/4, E1/2 W1/2, SW1/4 NW1/4
	1941	Sherry Bowen	Sale-Cash Entry (3 Stat. 566; April 24, 1820)	W1/2 SW
19	1913	Old Pueblo Copper Co.	Mineral Patent-Lode (14 Stat. 251; July 26, 1866)	entire section
	1932	W. Fred Kain	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	W1/2 NE, SE1/4 NE1/4
	1939	J. Ralph Anklam	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	NE1/4 NW1/4
	1941	Sherry Bowen	Sale-Cash Entry (3 Stat. 566; April 24, 1820)	NW1/4 NW1/4
	1943	Sherry Bowen	Exchange-Private-Taylor Act (48 Stat. 1269; June 28, 1934)	S1/2 NW, N1/2 SW, SE1/4 SW1/4
	1955	David G. Hibbs	Sale-Title 32 Chapter 7 (RS 2353 43 USC 672)	portions of NE 1/4 NE1/4

8. Cultural Resources

Table 8-3. Continued.

Township 14 South, Range 13 East				
Sect. No.	Year	Patentee	Statute	Aliquot Parts
	1974	Pima County Parks and Rec Department	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	SE1/4
28	1921	Alexander J. Davidson	Homestead Entry-Original (12 Stat. 392); May 20, 1862	SE1/4 NE 1/4
	1927	Alexander J. Davidson	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	NE1/4 NE1/4, SW1/4 NE1/4
	1932	Francis E. Smith	Mineral Patent-Lode (14 Stat. 251; July 26, 1866)	entire section
	1932	W. Fred Kain	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	NE1/4
	1932	Albert F. Quirm	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	NW1/4 NE1/4
	1949	State of Arizona	Exchange-State Taylor Act (48 Stat. 1269; June 28, 1934)	SW1/4, W1/2 SE1/4
	1962	City of Tucson	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	S1/2 NE1/4 SE1/4, N1/2 SE1/4 SE1/4
	1965	City of Tucson	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	S1/2 SE1/4 SE1/4
29	1932	Ben F. Martin	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	N1/2
	1949	State of Arizona	Exchange-State Taylor Act (48 Stat. 1269; June 28, 1934)	S1/2
30	1949	State of Arizona	Exchange-State Taylor Act (48 Stat. 1269; June 28, 1934)	NW1/4 SW1/4, N1/2 SE
	1950	State of Arizona	Exchange-State Taylor Act (48 Stat. 1269; June 28, 1934)	N1/2
	1957	Andrew W. Cannalisto	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SE1/4 SE1/4
	1957	Max Noal Click	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SE1/4 SE1/4
	1957	Floyd E. Weil	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SE1/4 SE1/4
	1958	Donald Clark Brayton	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SW1/4 SE1/4
	1958	J. Robert Dolard	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SE1/4 SE1/4
	1958	Harley W. Fellom	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SE1/4 SE1/4
	1958	John Vernon Gucciardo	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SE1/4 SW1/4
	1958	Philip Gucciardo	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SW1/4 SE1/4
	1958	Stanley G. Lorman	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SW1/4 SW1/4
	1958	Lee W. McCutchen	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SE1/4 SE1/4
	1958	Donald J. McGuire	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SW1/4 SW1/4
	1958	Richard D. McKeethen	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SW1/4 SE1/4

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Table 8-3. Continued.

Township 14 South, Range 13 East				
Sect. No.	Year	Patentee	Statute	Aliquot Parts
30	1958	Leo S. Rendon	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SE1/4 SW1/4
	1958	Marguerite B. Rickel	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SW1/4 SW1/4
	1958	Robert J. Russell	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SE1/4 SE1/4
	1958	Clarence Allen Saunders	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SW1/4 SE1/4
	1958	William R. Sears	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SE1/4 SE1/4
	1958	John Williams	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SE1/4 SW1/4
	1959	Richard E. Bellamy	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SW1/4 SE1/4
	1959	Edward M. Hayes	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SE1/4 SE1/4
	1959	Billy Fox Lewers	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SE1/4 SW1/4
	1959	Johnnie L. Ritter	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SE1/4 SE1/4
	1959	Leonard B. Siegel	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SE1/4 SE1/4
	1959	Frank Wadlington	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SW1/4 SW1/4
	1962	Stella A. Lovelace	Sale-Small Tract (52 Stat. 609; June 1, 1938)	portion of SE1/4 SE1/4
	1970	Catalina Council Boy Scouts of America	Sale-Rec and Public Purposes (44 Stat. 741; June 14, 1926)	N1/2 SE1/4 SW1/4, N1/2 SW1/4 SE1/4, portions of SW1/4 SW1/4
32	1910	State of Arizona	Arizona Enabling Act (36 Stat. 557; June 20, 1910)	entire section
33	1928	William G. Brothers	Homestead Entry-Original (12 Stat. 392); May 20, 1862	SE1/4 SE1/4
	1931	Everett Jones	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	E1/2 E1/2, SW1/4 NE1/4, NW1/4 SE1/4, SE1/4 NW1/4
	1935	Alonzo Alpha McAnear	Homestead Entry-Stock Raising (39 Stat. 862; December 29, 1916)	SW1/4
	1973	State of Arizona	Indemnity Selections (44 Stat. 1022; January 21, 1927)	SW1/4 NW1/4

8.5 Establishment of Tucson Mountain Park:

Tucson was a growing town in the early twentieth century, and civic leaders realized the necessity to preserve parts of the Tucson Basin and its environs for public enjoyment. During the 1920s, plans were discussed to set aside 60,000 acres (94 sq miles) in the Tucson Mountains, but objections were raised that this plan interfered with the integrity of the 1873 Homestead Act. A compromise was reached, and 31,012 (48 sq miles) acres within the proposed preserved area were re-opened for settlers. In 1929, the remaining 28,988 acres (45 sq miles) of the original plan were designated Tucson Mountain Park, to be administered by Pima County. However, mining and other activities were not prohibited by the designation, so 15,360 acres (24 sq miles) were made a national monument to prevent these kinds of commercial activities. This segment was known as the Tucson Mountain unit, or West unit, of Saguaro National Monument (now Saguaro National Park). In 1974, 3,000 acres (4.6 sq miles) were added to the park, and two years later, in 1976, 5,378 acres (8.5 sq miles) were added to Saguaro National Park. In 1994, 3,460 acres (5.4 sq miles) were added to the park. By 1994, Tucson Mountain Park and the West unit of Saguaro National Park totaled 40,826 acres (64 sq miles) (Kring 2002). In 2000, the Arizona Open Land Trust obtained 2 parcels totaling 750 acres, which were added to Tucson Mountain Park.

Tucson Mountain Park, administered by Pima County, encompasses approximately 18,750 acres. The project area also includes lands that belong to the Bureau of Reclamation and the Bureau of Land Management but which are administered as part of Tucson Mountain Park, and a proposed addition including the Robles Pass trailhead. Only a small percentage of the total project area, 6,066 acres (25 percent) has been surveyed for cultural resources. The majority of the project area (17,504 acres; 75 percent) has not been surveyed for cultural resources. However, by comparing those areas that have been surveyed with those surveys conducted on adjacent lands belonging to Saguaro National Park and administered by the National Park Service (Neff et al. 2001, Wellman 1994, Wells and Reutter 1997), it is very likely that surveying the entirety of Tucson Mountain Park would document significantly more archaeological sites and historical properties.

8.6 Methodology:

A records check was conducted at the Archaeological Records Office of the Arizona State Museum and online at AZSITE for all information on recorded archaeological remains and previous surveys within the boundaries of the project area. In addition, information on file at Desert Archaeology, Inc., compiled during previous work in the area, was evaluated. No field visit was conducted during this project. This report reflects data recorded in AZSITE as of 10 September 2007.

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8.7 Previous Archaeological Surveys in the Project Area:

Forty-three cultural resource surveys have been undertaken wholly or partially within the boundaries of the project area (Table 8-4; Figure 8-B). These surveys have covered only 25 percent of the project area; most were undertaken for compliance purposes. Thirty-three of the surveys are more than ten years old. Accepted survey procedures have changed since these surveys were completed, and typically, older surveys do not meet current compliance requirements. These surveys are summarized in Table 8-4.

Table 8-4. Archaeological surveys within Tucson Mountain Park.

Project No.	Project Name	Institution	Sponsor
1980-136.ASM	Tucson FM Powerline - Tucson Mountains	Arizona State Museum	Tucson FM Engineering
1980-242.ASM	Proposed TEP Tortolita-South Utility Corridor	John P. Wilson	Tucson Electric Power
1981-9.ASM	Pima County Land Exchange	Arizona State Museum	Pima County
1982-30.ASM	South of Ajo Survey	Arizona State Museum	none
1982-47.ASM	Materials Test Pit Locations in Tucson	Bureau of Land Management, Phoenix	Bureau of Land Management
1982-207.ASM	Tucson-Apache 115 kV Transmission Line	Complete Archaeological Services Assoc.	Western Area Power Administration
1984-28.ASM	F-037-1-921	Arizona State Museum	Arizona Department of Transportation
1984-169.ASM	Archaeological Clearance Survey	Arizona State Museum	Cheyne Owen, Ltd.
1984-210.ASM	Star Pass Archaeological Project	Cultural and Environmental Systems	Carl Winters and Uni-West
1985-21.ASM	Archaeological Survey of Kennedy Park	Institute for American Research	Urban/Engineering
1985-53.ASM	City of Tucson-CAP Water Treatment	Arizona State Museum	James M. Montgomery, Consulting Engineers
1985-59.ASM	ADOT Statewide Survey (Pit 964)	Arizona State Museum	Arizona Department of Transportation
1986-109.ASM	Tucson Aqueduct Project - Phase B	Arizona State Museum	Bureau of Reclamation
1986-202.ASM	Tucson Aqueduct - Tucson Tunnel	Bureau of Reclamation	Bureau of Reclamation
1986-248.ASM	Saguaro-TMU Fenceline	Western Archaeological & Conservation Center	Western Archaeological and Conservation Center
1987-16.ASM	Camino de Oeste Survey	Arizona State Museum	Cheyne-Owen, Ltd.
1987-47.ASM	Archaeological Survey of 2 Miles of Pipeline	Arizona State Museum	Bureau of Reclamation
1987-80.ASM	Task 2 Surveys	Arizona State Museum	Bureau of Reclamation
1987-126.ASM	Kup Mountain Recording	Arizona State Museum	Arizona State Museum
1987-215.ASM	Wyoming Street-Irvington Road Alignment	Institute for American Research	Pima Co. Transportation and Flood Control
1988-88.ASM	Mile Wide Road Survey	Cultural and Environmental Systems	Trico Electric Cooperative
1990-75.ASM	Ventana Creek	Desert Archaeology	Cella Barr Associates
1990-98.ASM	Trails End "F" Zone Reservoir	Cultural and Environmental Systems	BKS Engineers, Inc.
1990-146.ASM	Sandario Road East-West Survey	Cultural and Environmental Systems	Trico Electric Cooperative
1991-65.ASM	Section 25 Easement Survey	Cultural and Environmental Systems	Trico Electric Cooperative
1991-201.ASM	Sandario Road Survey	SWCA	Trico Electric Cooperative

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Table 8-4. Continued

Project No.	Project Name	Institution	Sponsor
1992-180.ASM	Kennedy Park Survey	SWCA	Tucson Unified School District
1993-239.ASM	ADOT State Route 86 - Robles Pass	Archaeological Research Services	Arizona Department of Transportation
1994-28.ASM	Desert Museum Survey	Tierra Right-of-Way Services	Arizona-Sonora Desert Museum
1994-103.ASM	Desert Museum New Exhibits Survey	Tierra Right-of-Way Services	Arizona-Sonora Desert Museum
1995-269.ASM	Irvington Rd. 80-Acre Survey	Tierra ROW Services	Irvington 77 L.L.C.
1996-170.ASM	Unknown	unknown	unknown
1996-462.ASM	CAVSARP Pipeline Survey	Desert Archaeology	City of Tucson
1998-387.ASM	Saguaro Cliffs Survey	Desert Archaeology	Urban Engineering
1999-2.ASM	CAVSARP Pipeline Survey	Desert Archaeology	City of Tucson
2000-223.ASM	Feliz Paseos Park Cultural Resources Survey	Old Pueblo Archaeology Center	Pima County
2001-132.ASM	Trico Old Tucson Overhead Powerline	SWCA	Trico Electric Cooperative
2001-628.ASM	Northwest Quadrant Main Survey	Desert Archaeology	City of Tucson
2002-5.ASM	Camino de la Oeste	Tierra Right-of-Way Services	Cox Communications
2002-45.ASM	Archaeological Survey of Kinney Road	SWCA	Trico Electric Cooperative
2002-346.ASM	Trico Tucson Mountain Park Pole Replacement Project	SWCA	Trico Electric Cooperative
2003-551.ASM	Trico Three Points Substation Survey	SWCA	Trico Electric Cooperative
SHPO-2003-0861	Ca-Tel Cox Communications Proposed	Tierra Right-of-Way Services	Ca-Tel

NOTE:

Figure 8-B: Previous Survey Projects within One Mile of Project Area, is not included in this report. Copies of this figure are on file with the Pima County Natural Resources, Parks and Recreation Department.

8.8 Archaeological Sites Within the Project Area:

Forty-eight archaeological sites have been identified within the boundaries of the project area; all but one were recommended as eligible for inclusion in the National Register of Historic Places (Table 8-5; Figure 8-C). Many cluster in the southeastern and northwestern parts of Tucson Mountain Park, although a small number have been recorded elsewhere within the project area. The sites recorded in the 1950s and 1960s were identified by archaeologists and others hiking in the area, and were recorded accordingly. Since the 1980s, sites have been identified as a result of archaeological surveys for compliance prior to various proposed projects (e.g. Hartmann 1981). Only three sites have been identified in the past 5 years. The remaining sites were all identified and surveyed between 10 and 48 years ago. The surface manifestations of these sites have undoubtedly changed during the intervening decades as the result of erosion and other natural processes as well as, perhaps, human activity. Resurveys of these sites are recommended. This will enable management plans to address and prioritize issues regarding preservation at these sites.

However, the majority of Tucson Mountain Park has not been surveyed for cultural resources. A complete inventory of resources is critical as a basis for any management plan, and it is recommended that the park be systematically surveyed for cultural and historical properties. The resulting database would provide invaluable information with which to approach all management and planning issues.

Table 8-5. Archaeological sites recorded within Tucson Mountain Park.

Site No. and Name	Recording Date	Site Type	Occupation Date	Institution
AZ AA:16:1 (ASM)	1981	artifact scatter	Hohokam	Arizona State Museum
AZ AA:16:2 (ASM)	1981	artifact scatter	Prehistoric	Arizona State Museum
AZ AA:16:16 (ASM), Black Sheep Cave	1959	petroglyph, ceramic artifact	Prehistoric	Arizona State Museum
AZ AA:16:31 (ASM)	1965	artifact scatter	Hohokam	Arizona State Museum
AZ AA:16:32 (ASM)	1965	Native American sherds, mining slag and pits	Historic Native American 1840- 1920, Historic	Arizona State Museum
AZ AA:16:34 (ASM)	1967	artifact scatter	Archaic, Hohokam	Arizona State Museum
AZ AA:16:37 (ASM)	1970	rockshelters, artifact scatter	Hohokam	Arizona State Museum
AZ AA:16:38 (ASM)	1971	petroglyph	Prehistoric	Arizona State Museum
AZ AA:16:64 (ASM)	1980	artifact scatter, historic cairn	Prehistoric, Historic	Arizona State Museum
AZ AA:16:65 (ASM)	1980	artifact scatter	Historic Native American 1840- 1920	Arizona State Museum
AZ AA:16:70 (ASM)	1981	quarry, artifact scatter	Prehistoric	Arizona State Museum
AZ AA:16:71 (ASM)	1980	artifact scatter	Hohokam	Arizona State Museum
AZ AA:16:72 (ASM)	1980	quarry, lithic scatter	Hohokam	Arizona State Museum
AZ AA:16:73 (ASM)	1980	ceramic scatter	Historic Native American 1840- 1920	Arizona State Museum
AZ AA:16:74 (ASM)	1980	rock circle, artifact scatter	Hohokam	Arizona State Museum
AZ AA:16:75 (ASM)	1981	mine shaft and tunnel	Historic	Arizona State Museum
AZ AA:16:76 (ASM)	1981	rock pile, artifact scatter	Hohokam	Arizona State Museum
AZ AA:16:77 (ASM)	1981	rock feature, artifact scatter	Prehistoric	Arizona State Museum
AZ AA:16:78 (ASM)	1981	lithic scatter	Prehistoric	Arizona State Museum

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Table 8-5. Continued.

Site No. and Name	Recording Date	Site Type	Occupation Date	Institution
AZ AA:16:79 (ASM)	1981	historic structure, trash scatter	Historic	Arizona State Museum
AZ AA:16:80 (ASM)	1981	historic well, wall, and tanks	Historic	Arizona State Museum
AZ AA:16:81 (ASM)	1981	rock ring, artifact scatter	Historic	Arizona State Museum
AZ AA:16:82 (ASM)	1981	artifact scatter	Prehistoric	Arizona State Museum
AZ AA:16:83 (ASM), Starr Pass Trail	1981	historic road	Historic 1884	Arizona State Museum
AZ AA:16:89 (ASM)	1982	rock circle, lithic scatter	Hohokam	Arizona State Museum
AZ AA:16:90 (ASM)	1982	rock circle, lithic scatter	Prehistoric	Arizona State Museum
AZ AA:16:92 (ASM)	1982	petroglyph	Prehistoric	Arizona State Museum
AZ AA:16:93 (ASM)	1982	petroglyph	Prehistoric	Arizona State Museum
AZ AA:16:95 (ASM)	1983	artifact scatter	possibly Protohistoric	Arizona State Museum
AZ AA:16:96 (ASM)	1983	rock feature, lithic scatter	Prehistoric	Arizona State Museum
AZ AA:16:175 (ASM)	1984	quarry	Prehistoric	Arizona State Museum
AZ AA:16:305 (ASM)	1986	rock features, artifact scatter	Hohokam, Protohistoric	Arizona State Museum
AZ AA:16:306 (ASM)	1986	artifact scatter	Hohokam	Arizona State Museum
AZ AA:16:307 (ASM)	1986	rock features, artifact scatter	Prehistoric	Lone Mountain
AZ AA:16:309 (ASM)	1986	roasting pits, artifact scatter	Hohokam	Arizona State Museum
AZ AA:16:311 (ASM)	1986	habitation site, roasting pits, trash mounds, cleared area, artifact scatter	Hohokam	Arizona State Museum
AZ AA:16:316 (ASM)	1987	rock features, artifact scatter	Hohokam	Arizona State Museum
AZ AA:16:346 (ASM), Bowen Homestead	1992	homestead	Historic 1931	Sandra Mullens-Reid
AZ AA:16:381 (ASM)	1994	rock features, lithic scatter	Prehistoric	Tierra Right-of-Way
AZ AA:16:382 (ASM)	1994	lithic scatter	Prehistoric	Tierra Right-of-Way
AZ AA:16:383 (ASM)	1994	lithic scatter	Prehistoric	Tierra Right-of-Way
AZ AA:16:384 (ASM)	1994	rock dam	Historic, 1933- 1941	Tierra Right-of-Way
AZ AA:16:402 (ASM)	1996	lithic scatter, historic trash	Prehistoric, Historic 1920s- 1950s	Unknown
AZ AA:16:423 (ASM)	1998	artifact scatter	Hohokam	Unknown
AZ AA:16:446 (ASM)	2002	rock features, artifact scatter	Prehistoric	SWCA
AZ AA:16:447 (ASM)	2002	rock pile, lithic scatter	Prehistoric	SWCA
AZ AA:16:448 (ASM)	2002	artifact scatter	Prehistoric	SWCA
AZ AA:16:516 (ASM)	Unknown	prospector's pit	Historic	Harris Environmental Group

NOTE:

Figure 8-C: Previously Recorded Archaeological Sites within Tucson Mountain Park, is not included in this report. Copies of this figure are on file with the Pima County Natural Resources, Parks and Recreation Department.

8.9 Archaeological Site Types:

Archaeological sites located within Tucson Mountain Park can be divided between prehistoric and historic sites. Prehistoric sites run the gamut in time from possible Archaic sites through Protohistoric sites, and range from artifact scatters to rock features, a cave site, and petroglyph sites. Historic-era sites include structures, ranch-related sites, mining sites, and trash scatters.

Several projects have surveyed portions of the neighboring Saguaro National Park East, and have identified dozens of prehistoric and historic-era sites (Neff et al. 2001, Wellman 1994, Wells and Reutter 1997). The results of these surveys indicate that prehistoric and historic-era use of the Tucson Mountain Park area was extensive and varied. The probability of unrecorded archaeological sites and cultural properties within the project area is very high.

The following section details the identified archaeological sites within the project area. The cultural and temporal affiliation of the sites are discussed, when known, as well as any features and artifact assemblages that were present when the site was first recorded. Sites are presented within the broader categories of prehistoric and historic-era time frames. Sites are grouped by categories as identified by the original surveyors on the official site cards filed at the Archaeological Records Office at the Arizona State Museum. In many instances, site activities and functions overlap categories, but for organizational purposes, the site type as recorded on the site card is used to categorize individual sites in this report.

8.10 Prehistoric Sites:

The majority of identified archaeological sites in Tucson Mountain Park date to the prehistoric era, defined as before A.D. 1450. Thirty-six prehistoric sites have been recorded in the project area, and range from small artifact scatters and petroglyph sites to resource-processing sites and a possible habitation site. The known archaeological sites are summarized below from information curated at the Archaeological Records Office at the Arizona State Museum and online at AZSITE. Many of these sites have never been revisited since their initial identification, and information may be inadequate or outdated.

Rock Art Sites

Rock art sites are common in the Tucson Mountains, and are either representational or geometric in content. Representational art depicts humans, animals, plants, or objects, although these can appear abstract. Geometric designs include spirals, wavy lines, circles, and other shapes. Petroglyphs have been pecked, scraped, or ground onto rock surfaces. This causes the dark, outer layer of the rock to be removed and the lighter, underlying material exposed. Pictographs are paintings on rocks, created by the use of a pigment and binder on a rock surface. Pictographs are less common in Arizona, but this may be a factor of preservation rather than prehistoric preference for one art form over another (Thiel 1995).

AZ AA:16:16 (ASM). The site was recorded in 1959, and is composed of pictographs located in a cave. The pictographs were drawn with thick black material, and some were patinated, suggesting greater age. The figures represented are mountain sheep, deer, and one large-headed animal, possibly

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another deer. A small bone disc bead was found in 5-7 cm of sediment in a shallow depression located in the center of the cave. No other artifacts were identified. Because of the lack of diagnostic materials, no occupation date has been suggested for this site.

AZ AA:16:38 (ASM). The site was first recorded in 1971, and is composed of geometric designs on two boulders. The site is believed to date to the Hohokam cultural tradition, between A.D. 650-1450.

AZ AA:16:92 (ASM). Recorded in 1982, the site is composed of three petroglyphs and an area of indeterminate pecking on a large boulder. The site is believed to date to the Hohokam cultural tradition, between A.D. 650-1450. Vandalism is a concern for the petroglyphs as they are located in an accessible area.

AZ AA:16:93 (ASM). The site was recorded in 1982, and is composed of 28 petroglyphs pecked onto boulders near a wash. At the time these were first recorded, there was little patination of the pecked areas, suggesting these were not ancient in date, but their style was consistent with known Hohokam petroglyphs. Therefore, AA:16:93 was interpreted as a Hohokam site, despite the limited patination of the elements. The petroglyphs had been vandalized prior to their initial recording, and this remains a potential hazard for all petroglyph sites in the park.

Artifact Scatters

Artifact scatters are assemblages of artifacts without any surface features, such as rock piles or trash mounds. Artifact scatters can be composed of single artifact categories, such as ceramics or flaked stone, or may include multiple artifact categories, such as ceramics, ground stone, and flaked stone. Artifact scatters can represent particular activity areas (e.g., a flaked stone chipping station, where a core was reduced to flakes), and are sometimes the only surface manifestation of a temporary camping site or resource-processing locus.

AZ AA:16:31 (ASM). The site was recorded in 1965, and is composed of a small artifact scatter on the southern side of Sahuaro Road. The ceramic assemblage included Tanque Verde Red-on-brown, Gila plain wares, and red wares. One worked sherd was part of the assemblage. Chipped stone debris was also present. These indicate an occupation between A.D. 950-1450, in the most recent ceramic chronology developed for the Tucson Basin.

AZ AA:16:34 (ASM). The site was recorded in 1967, and is composed of ceramic and chipped stone artifacts. A Clovis fluted point was present at the site, and suggested a possible Paleoindian component. The presence of Hohokam ceramics indicated a much later occupation between A.D. 650-1450.

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AZ AA:16:37 (ASM). The site was recorded in 1970, and is composed of a moderate-density artifact scatter of ceramic and chipped stone artifacts. Two small, informal rockshelters, one formed by two large boulders leaning against each other, were also identified. Diagnostic ceramic artifacts included Gila Plain, Rillito Red-on-brown, and Rincon Polychrome sherds, dating the site to A.D. 950-1450, in the most recent ceramic chronology developed for the Tucson Basin.

AZ AA:16:64 (ASM). Recorded in 1980, the site is composed of a low- to moderate-density artifact scatter on the top of a knoll. The surface artifact assemblage was clustered in two distinct locations. One cluster was composed of flaked stone artifacts; the second was composed of flaked stone and ceramic sherds. One red-on-brown sherd indicated an occupation date during the Hohokam period (A.D. 650-1450). A rock cairn, suspected to be historic era in date, was also present, although its function was unknown.

AZ AA:16:65 (ASM). The site was recorded in 1980, and was composed of a low-density artifact scatter on the side of a jeep trail. The surface artifact scatter included ceramic sherds, two identified as Papago Red and Papago plain wares, and one worked sherd. The ceramics date the site between 1840 and 1920. The chipped stone assemblage was very low density, consisting of 2 flakes. Modern campfire rings and trash, and a jeep trail that traversed the eastern end of the site, indicated that recent human activity had affected the integrity of the site.

AZ AA:16:82 (ASM). The site is an artifact scatter initially recorded in 1981. The surface artifact assemblage is composed of ground stone manos, metates, and pestles, and chipped stone flakes, a scraper, and a hammerstone. The assemblage was believed to date to the Archaic period. One very eroded Hohokam brown ware sherd was also identified, but the recorders did not believe that this was contemporary with the major occupation at the site.

AZ AA:16:95 (ASM). Recorded in 1983, the site is composed of an artifact scatter of ceramic and flaked stone artifacts. Although the site card on file at the Archaeological Records Office does not elaborate on their interpretation, the surveyors suggested that the site is Protohistoric in date.

AZ AA:16:382 (ASM). The site was identified in 1994, and is composed of a low density flaked stone artifact scatter. The artifacts consist of primary flakes and cores of basalt, rhyolite, and quartzite. The flakes indicate that chipped stone tool reduction, and possibly tool manufacturing, occurred at the site. As no diagnostic artifacts were present, it was not possible to assign the site to a particular period within prehistory.

AZ AA:16:383 (ASM). The site was identified in 1994, and is composed of a low density of chipped stone flakes and cores made from basalt and quartzite. Two chipping stations were identified, and were composed of cores, tested pieces, and primary flakes. The artifacts indicate that chipped stone tool reduction, and possibly manufacturing, occurred on site. The lack of diagnostic artifacts

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prohibited assigning the site to a particular period in prehistory. AA:16:383 may be part of a larger site, along with AZ AA:16:381 (ASM), although the exact relationship between these two sites cannot be determined because of their location on the grounds of the Arizona-Sonora Desert Museum, which presence has disrupted the physical continuity of these sites.

AZ AA:16:402 (ASM). The prehistoric site was identified in 1996 and is composed of several chipping stations and a moderate-density chipped stone artifact scatter. Thirteen cores, 180 flakes, 3 hammerstones, and 3 retouched flakes were identified. The majority of artifacts were made from metasedimentary material. The artifacts were all collected, and the site subsequently destroyed by construction activities and the realignment of a path at the Arizona-Sonora Desert Museum. The site card on file with AZSITE records that historic trash dating between the 1920s and 1950s was also present, although no details were offered. The recorders speculated that these artifacts were related to Civilian Conservation Corps work in the area.

AZ AA:16:423 (ASM). Recorded in 1998, the site is an artifact scatter composed of ceramic and chipped stone artifacts. The ceramics indicate that the site dates to the Hohokam cultural tradition, between A.D. 650 and 1450.

AZ AA:16:448 (ASM). The site was recorded in 2002, and is composed of a low- to moderate-density artifact scatter, totaling approximately 200 artifacts. Most of the artifacts were rhyolite primary and secondary flakes, although one ceramic sherd was identified. A modern campfire ring was present near the site boundary. As no diagnostic artifacts were present, it was not possible to assign the site to a particular period in prehistory.

Quarries

Several site cards identified sites as quarries, where raw material was extracted and manufactured into chipped stone artifacts. Many of the artifact scatters at sites discussed above include evidence for stone tool manufacturing, but official site cards do not identify these sites as quarries. Resurveying these sites would eliminate confusion over their designation and clarify whether they functioned solely as quarries or whether stone tool manufacturing was one of several activities undertaken at the site.

AZ AA:16:70 (ASM). See section on rock features below.

AZ AA:16:71 (ASM). The site was recorded in 1980, and composed of five chipping stations located amidst surface cobble beds. The artifact assemblage was dominated by chipped stone primary and secondary flakes, but nine plain ware sherds were also present. Their presence was used by the surveyors to place the occupation of the site during the Hohokam period (A.D. 650-1450). The site was interpreted as a quarry by the original surveyors.

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AZ AA:16:72 (ASM). AA:16:72 was recorded in 1980, and composed of a high-density chipped stone assemblage in four clusters scattered across the site. The assemblage was dominated by primary flakes, but secondary flakes and cores were also present. One flake scraper and one retouched primary flake were the only identified tools. The assemblage was estimated to be between 300 and 400 flakes. The original surveyors believed the occupation of the site dated to the Hohokam period (A.D. 650-1450).

AZ AA:16:78 (ASM). The site was recorded in 1981. It was composed of two lithic concentrations, with low- to moderate-density chipped stone assemblages. The primary and secondary flakes, some of which exhibited secondary retouch, and cores were made from rhyolite and andesite. Outcrops of these fine-grained materials were present and were used as the raw material for the artifacts. Although no diagnostic artifacts were identified, a date during the Hohokam period (A.D. 650-1450) was suggested.

AZ AA:16:175 (ASM). Recorded in 1984, the site was identified as a quarry, with cores and flaked stone artifacts. No diagnostic materials were identified, so a generalized date of prehistoric was suggested.

Rock Features

Rock features take many forms: circles or rings, piles, and linear alignments. Rock features have been interpreted as remains of thermal features, planting piles for agave, or basket rests. Linear alignments are interpreted as erosion control methods or other agricultural features.

AZ AA:16:1 (ASM). AA:16:1 was first recorded in 1938 and re-recorded in 1981. The site was composed of two rock rings and a low-density artifact scatter. The surface artifact assemblage included Hohokam Rillito Red-on-brown and Rincon Red-on-brown as well as plain ware ceramics, suggesting an occupation between A.D. 850-1150. One small projectile point was recorded; the 1981 site card identified it as a Rincon-phase point. Modern campfire rings were present in 1981, but the surveyors did not believe much vandalism had occurred to the site.

AZ AA:16:2 (ASM). The site was recorded between 1938 and 1942, although it was resurveyed in 1981. The site was composed of two loci. Two rock rings and a low-density sherd and chipped stone scatter comprised one locus, with utilized flakes the majority of the lithic assemblage. The site card noted that these were made from materials not indigenous to the site. The second locus contained 100 flakes, 1 chopper, 2 quartzite mano fragments, and 1 plain ware sherd. Two broken projectile points from the second locus were collected. Tanque Verde Red-on-brown sherds were present, suggesting an occupation during the Hohokam Classic period, now dated to AD 1150-1300. The site card noted that an Archaic period occupation was also suspected at the site.

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AZ AA:16:70 (ASM). The site was recorded in 1981, and was composed of several rock alignments, hearths, and an artifact scatter. The high-density artifact scatter was dominated by chipped stone primary flakes and cores, leading the recorders to identify the site as a quarry. One hammerstone was also identified. A very low-density ceramic assemblage was also present, and contained incised brown ware and Hohokam period (A.D. 650-1450) plain ware sherds.

AZ AA:16:74 (ASM). Recorded in 1980, the site is composed of a single rock ring and a low-density artifact scatter. The surface artifact assemblage was composed of 18 very eroded Hohokam period (A.D. 650-1450) brown ware sherds, 7 chipped stone flakes and 2 core tools (1 chopper and 1 retouched flake). A historic-era marker and three small rock clusters forming a triangle with the historic marker in the center, were also present. At the time of the survey, jeep trails traversed the site and human foot traffic had disturbed the area.

AZ AA:16:76 (ASM). AA:16:76 was recorded in 1981, and was composed of a rock pile, a small pit, and low-density artifact scatter. The ceramic artifacts included plain wares and Tanque Verde Red-on-brown Hohokam sherds. The flaked stone assemblage was very low-density, comprised of just three flakes. A ground stone quartzite mano was also present. The artifact assemblage, although small, indicates that resource processing activities occurred at the site, and indicate occupation between A.D. 950-1250, based on the most recent ceramic chronology developed for the Tucson Basin. Modern trash on the site at the time of the survey indicated that human activity was affecting the integrity of the site.

AZ AA:16:77 (ASM). The site was recorded in 1981, and was composed of a rock enclosure and low-density artifact assemblage. The surface artifact assemblage was composed of three fragments of a basin metate, and eight plain ware sherds. The lack of diagnostic artifacts prohibited assigning the site's occupation to a particular period in prehistory.

AZ AA:16:81 (ASM). The site was recorded in 1981. It is composed of a small cleared area surrounded by bedrock outcrops which were augmented by the piling of additional boulders atop the natural outcrops. A low-density artifact scatter composed of ceramics and primary flakes, one core and one chopper was present. The sherds were very eroded, but were identifiable as Hohokam brown wares, placing the occupation between A.D. 650-1450.

AZ AA:16:89 (ASM). AA:16:89 was recorded in 1982, and was composed of an eroded rock ring and a low-density artifact scatter. Three plain ware sherds were observed, but the majority of artifacts were chipped stone flakes, cores, and debris. The chipped stone assemblage indicated that tool reduction, and possibly manufacturing, occurred on site. The site was interpreted as dating to the Hohokam cultural tradition, between A.D. 650-1450.

AZ AA:16:90 (ASM). The site was recorded in 1982. It is composed of a rock ring and low-density chipped stone artifacts at the top of a small hill. There were no diagnostic artifacts, and a cultural affiliation could not be determined, but the recorders suspected the site was Hohokam in nature.

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AZ AA:16:96 (ASM). Recorded in 1983, the site was composed of one rock feature and a flaked stone scatter. No diagnostics were identified at the site, so only a generalized occupation date of prehistoric could be suggested.

AZ AA:16:305 (ASM). The site was recorded in 1986, and was composed of two possible rock features and an artifact scatter of ceramic, flaked stone, and ground stone artifacts. The surveyors suggested an occupation in the Protohistoric era.

AZ AA:16:306 (ASM). AA:16:306 was recorded in 1986, and was composed of an artifact scatter of ceramics and flaked stone artifacts. Among the diagnostic ceramics were Rincon ceramics, dating the site to the Hohokam cultural tradition (A.D. 650-1450).

AZ AA:16:307 (ASM). The site was first recorded in 1986 and is composed of a low-density artifact scatter and rock features. One deflated roasting pit and a second possible roasting pit are present within the site; the surveyors also identified a roasting pit located 76 m northwest of the site, but this was not included within AA:16:307. The artifact scatter is low density and includes ceramics, chipped stone, and ground stone artifacts.

AZ AA:16:309 (ASM). The site was recorded in 1986, and was composed of several possible roasting pits and an artifact scatter of ceramic and flaked stone artifacts. The site was dated to the Hohokam cultural tradition (A.D. 650-1450) by the surveyors.

AZ AA:16:311 (ASM). AA:16:311 was recorded in 1986 and interpreted as a Hohokam habitation site (A.D. 650-1450). The identified features included roasting pits, four trash mounds, and a cleared area the surveyors speculated may have been a possible ballcourt. An artifact scatter of ceramic and flaked stone material was also present.

AZ AA:16:316 (ASM). The site was recorded in 1987, and was composed of four rock features and a low-density artifact scatter. The four rock features included a 2-course terrace, one rock circle, one rock pile, and a possible enclosure. The surface artifact scatter included one dozen plain ware sherds, one unidentifiable red-on-brown sherd, and two chipped stone flakes. The flakes were made from basalt and chert. The presence of the red-on brown sherd suggested an affiliation with the Hohokam cultural tradition (A.D. 650-1450).

AZ AA:16:381 (ASM). The site was identified in 1994, and is composed of an undefined rock alignment and a rock pile, both of which were originally recorded as possible natural features. A moderate density of ceramic and chipped stone artifacts was also present, and may reflect a multicomponent site with Archaic and Hohokam period occupations. AA:16:381 should be resurveyed so that a definitive assessment of the possible features can be made for planning purposes.

AZ AA:16:446 (ASM). The site was first recorded in 2002, and is composed of 47 rock piles and an artifact scatter. The site is located on a terrace overlooking a seasonal drainage. Additional eroded rock piles may be represented by vague clusters of rocks present at the site that did not have sufficient integrity to warrant being recorded as features. The majority of chipped stone artifacts were made from rhyolite, and numbered in the low hundreds. These were mainly secondary flakes, although primary flakes were identified. Cores were few in number. Several discrete chipping stations were identified. One single ceramic was also present, a plain ware with sand temper. The recorders suggested that AA:16:446 may be part of AA:16:70, located 300 m west of the site.

AZ AA:16:447 (ASM). AA:16:447 was recorded in 2002, and is composed of a low-density chipped stone artifact scatter and one rock pile. The flakes were made from rhyolite, and totaled approximately 100 secondary flakes and a small number of cores. One biface was noted. The lack of diagnostic artifacts prohibited assigning the site to a particular period in prehistory.

8.11 Historic-era Sites:

Historic-era use of the Tucson Mountain Park area by Euro-Americans began in the late nineteenth century. Many land patent titles were issued to small homesteaders for livestock raising. Several titles were patented by mining companies, but it is unclear how many claims were acted upon. Nine historic-era sites or sites with significant historic-era components have been identified in the project area. These sites are summarized below from information curated at the Archaeological Records Office at the Arizona State Museum and online at AZSITE. Many of these sites have never been revisited since their initial identification, and information may be inadequate or outdated.

Structures

AZ AA:16:79 (ASM). This site was recorded in 1981. It was composed of a rectangular structure with partially intact rock walls cemented by a pink mortar. One wall of the structure was complete along its length at the time of the initial recording of the site, but the other three walls were eroded and only partially complete. The maximum height of wall preserved at that time was 50 cm. Low-density historic trash was also present. The site was very eroded, and traversed by human foot trails and jeep roads in 1981. Although no date other than historic-era was assigned to the site at the time of its recording, a date between A.D. 1875 and 1950 is likely.

AZ AA:16:346 (ASM), the Bowen Homestead. The Bowen Homestead was recorded in 1992. The site is a small homestead that was inhabited in the first half of the twentieth century. Structures at the site include the house, outhouse, well, and a cement animal pond. Other features present include a trail, a road, and trash pits. Architectural drawings of the standing structures were made at the time of the survey (Mullens-Reed 1993). Deterioration of the structure was addressed by Pima County by the installation of wooden beams to prevent the collapse of lintels, but the structure walls have begun to deteriorate (Gayle H. Hartmann, personal communication 28 June 2007) and need to be addressed before these collapse.

Ranch and Ranch-related sites

AZ AA:16:80 (ASM). The site was recorded in 1981, and was composed of a well, a rock wall, and two metal tanks on and adjacent to a wash. An old fence line ran from one tank to the wash. Although no date other than historic-era was assigned to the site at the time of its recording, a date between A.D. 1875 and 1950 is likely. In 1981, the site had been disturbed by bulldozing, human foot trails, and vehicle tracks.

Mines and Mine-related sites

AZ AA:16:32 (ASM). AA:16:32 was recorded in 1965, and was composed of historic trash. Although the original site card provides no details on the mining-related artifacts that might be present, historic-era Papago red wares, which date between 1840 and 1920, were present.

AZ AA:16:75 (ASM). The site was recorded in 1981, and composed of a 12-ft-deep mine shaft and tunnel, and rubble from their excavation. Human foot traffic and a nearby jeep trail had disturbed the site and its environs at the time of its survey.

AZ AA:16:516 (ASM). The site is composed of a prospector's pit and six rock features. No artifacts were identified at the site. The prospector's pit is 3.1 m wide, and ranges from 4.5 m to 6.1 m deep. The rock features range from 0.9 m to 3.0 m in diameter, and several are 0.6 to 1.0 m high. The surveyors suspected that the rock features were modern in origin. The site was recommended as ineligible for inclusion in the National Register of Historic Places by the surveyor because of a lack of evidence for subsurface deposits.

Roads

AZ AA:16:83 (ASM). The site was recorded in 1981. Known as the Starr Pass Trail, it was originally a toll road to the mines at Quijotoa. The road, and the telegraph line along its length, were built by Richard Starr and platted in January 1884. Approximately 4 $\frac{3}{4}$ miles of the road were documented in 1981.

CCC/WPA Sites

The Civilian Conservation Corps (1933-1942) and Works Progress Administration (1935-1943) were work relief programs active during the 1930s and 1940s. CCC and WPA workers were employed building roads, erosion controls, fire towers, and dams, improving streams and restocking fish in lakes and rivers. The WPA was also involved in literacy, arts, and drama projects.

The CCC and the National Park Service constructed recreation and water control features in Tucson Mountain Park between 17 November 1933 and 21 June 1941 (Wells and Reutter 1997). Features constructed in Saguaro National Monument (now Saguaro National Park) include dams, ramadas, wildlife watering holes, and comfort stations, and similar features can be expected in Tucson Mountain Park.

A large number of CCC check dams, an underground water storage tank, a pump house, erosion control structures, a coke oven, and ramadas are known to have been constructed in Tucson Mountain Park, but few have been officially evaluated and assessed by archaeologists (Gayle H. Hartmann, personal communication 28 June 2007; Gale Bundrick, personal communication July 2007).

AZ AA:16:384 (ASM). The site is a masonry dam constructed by the CCC between 1933 and 1941. It was recorded in 1994, and is located at the intersection of King's Canyon wash and a secondary drainage. The northern portion of the dam was, at that time, intact, although the southern portion had eroded.

Historic Native American Sites

AZ AA:16:73 (ASM). The site was recorded in 1980, and is composed of a moderate-density ceramic sherd scatter. Seventy-seven Papago brown ware sherds, dating between 1840 and 1920, were identified, representing three jars. An arroyo was actively cutting through the site when it was recorded.

8.12 Cultural Resource Expectations for the Project Area:

Nearby archaeological surveys and data from other regions permit reasonable estimates of what may be present in the unsurveyed parts of the project area (Figure 8-D). Several of the archaeological sites recorded near the boundaries of Tucson Mountain Park extend onto Saguaro National Park. Surveys in the National Park indicate that site density is moderate in the eastern foothills of the Tucson Mountains. Near the northeastern border of the park, several mining operations were undertaken and mining features are spread across the landscape. The northeastern part of the park may include additional mining features, and their identification and assessment is important, as public safety may be at issue with regard to features such as mine shafts. There are several large sites to the southwest and west of the project area in Avra Valley, and sites related to these occupations (e.g., resource extraction or processing sites) can be expected in the bajadas of the western slope of the Tucson Mountains.

A survey for the Tucson Aqueduct Project, to the southwest of the park, summarized the large sites that are found near Brawley Wash and areas adjacent in Avra Valley (Wallace 1996). AZ AA:16:39 (ASM), also known as the Werner Site, extends down either side of East Brawley Wash and is a very large and varied site with the remains of extinct Pleistocene fauna as well as artifacts dating to the Archaic, Hohokam, and Protohistoric periods (Herr 2004). AZ AA:16:94 (ASM), also known as Water World, is a moderately-sized Hohokam ballcourt village dating to the Colonial period (A.D. 750-950). Excavations at the site were undertaken as a result of projected adverse impacts from the Tucson Aqueduct Project, and identified 45 structures, trash mounds, cemetery areas, a small ballcourt, and other features (Czaplicki and Ravesloot 1989). Although these two sites are several miles from the boundary of the project area, their inhabitants likely utilized the bajada, foothills, and mountainous resources within modern park boundaries for raw materials, plant and animal resources, and other functions.

NOTE:

Figure 8-D: Previously Recorded Archaeological Sites within One Mile of Project Area, is not included in this report. Copies of this figure are on file with the Pima County Natural Resources, Parks and Recreation Department.

A Class I inventory undertaken prior to the Tucson Aqueduct Project summarized information for a large portion of the western Tucson Basin, including the current project area (Czaplicki and Mayberry 1983; Czaplicki and Ravesloot 1989). The authors summarized the locations of archaeological sites over time based on information at the Arizona State Museum and at AZSITE. Although significantly more information is available today, the general trends identified by the authors apply. Human occupation of the western Tucson Basin intensified over time, with expansion into adjacent or previously unused territories and ecological niches as population in the Basin increased.

Additional resource processing sites in the Avra Valley bajada, that abuts the western flank of the Tucson Mountains, can be expected to be identified in the future. These sites are often ephemeral, composed of very low density artifact assemblages that are often difficult to identify without systematic pedestrian survey. The bajada would have offered access to plant resources to prehistoric inhabitants of the Avra Valley not found in other areas. Resource-processing sites are also likely to be identified in the Tucson Mountains, where lithic raw material resources are located. Seasonal hunting camps may also be present in the mountain zone. The mountainous central portion of the park may have additional petroglyph or pictograph sites in addition to the resource extraction sites such as quarries. Additional historic-era sites, such as trash scatters associated with homesteads, may be identified in the project area. Mining-related sites may also be present.

8.13 Summary and Conclusions:

Tucson Mountain Park and adjacent parcels encompass a large swath of undeveloped property that includes forty-eight known archaeological sites. The probability that a significant number of unrecorded sites exists is high, as the park straddles the Tucson Mountains, prized in prehistory and the historic era for raw material resources, and a portion of the upper bajada in Avra Valley, where a number of large sites have been recorded. Residents of these large sites would have undoubtedly traveled to the Tucson Mountains to extract resources, including flaked stone material, plants, and animals. Therefore, future surveys can expect to identify a number of sites of variable ages and functions in every environmental zone and econiche in the project area.

A large part (75 percent) of Tucson Mountain Park has not been surveyed for cultural resources. Surveying these areas for archaeological sites and cultural properties should be a high priority, as management issues and planning priorities cannot be established without a complete inventory of sites. However, this can be accomplished through a phased approach based on development needs (e.g., survey along a trail corridor for which improvements have been proposed). An appropriate, geographic information system (GIS)-based framework would allow easy access to information by managers and would facilitate long-term planning and preservation decisions.

8.14 Recommendations: Archaeological survey in those parts of the project area which have not been previously surveyed is necessary for the creation of an inventory and database to allow management decisions. Effective planning can only be undertaken with complete and up-to-date information, and therefore it is critical that the cultural resources of Tucson Mountain Park be inventoried. This can be accomplished through a phased approach that surveys areas targeted for specific development or improvement. A geographic information system (GIS) would layer and analyze information about the archeological sites, the environment, proposed projects, and many other datasets, and would facilitate management priorities and decisions.

The phased survey approach is tied to compliance-driven, specific development or improvement projects. However, if funding were available, a Park-wide sample survey is further suggested to complement the proposed, phased compliance-related archaeological survey. A sample survey strategy could be developed modeled on comparisons with similar environmental settings surveyed in the adjacent Tucson Mountain Division of Saguaro National Park, could be linked to proposed development or improvement projects within Tucson Mountain Park, would include the identification of archaeological and historic resources appropriate for preservation, and would also assess what, if any, impact public utilization of the park was having on specific cultural resources. This sample survey would facilitate future management plans by providing a statistically relevant sample of site densities and site types within the park. This would enhance the overall efficiency of management plans by allowing a more complete estimate to be derived for future projects, assessing their impacts on cultural resources, budgeting, prioritization, preservation, and other crucial planning issues.

The phased and sample survey approaches would further identify archaeological and historic resources that would be appropriate for possible interpretive programs. The larger goal of contributing to our understanding of the cultural history of the entire Tucson Basin would also be served. Tucson Mountain Park represents a large, relatively pristine and undeveloped area that encompasses a wide variety of the various environmental zones that were utilized in prehistory in the Basin, and as such preserves significant resources. The data generated by phased and sample surveys would provide substantial and meaningful data for future archaeological research in the Basin.

The locations of archaeological sites are sensitive data, and it is recommended that confidentiality of site locations continue. However, many of the historic-era sites and features, as well as rock art sites, are clearly visible to the public. Future considerations of trail closures in immediate proximity to some of these sites may be an option for preservation and protection.

Some of the cultural features located within Tucson Mountain Park may be Traditional Cultural Properties (TCPs), defined by National Park Service Bulletin No. 38 as places eligible for inclusion in the National Register of Historic Places because of their association with cultural practices and beliefs that are rooted in the history of a community and are important to maintaining the continuity of the community's traditional beliefs and practices. TCPS and sacred sites of the

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Tohono O'odham Nation and other Native People may be located within Tucson Mountain Park. The Park should consult with Native representatives to identify these sacred places so that future projects will not impact them. The locations of TCPs and sacred sites should be held in the strictest confidence, and in fact, may not be specifically revealed to Park management by Native People consultants. However, their identification by Native People in the present will enable planners to consult with Native People in the future to modify proposed plans to avoid TCPs and sacred sites.

The public's enthusiasm for archaeology is great, and public involvement is critical for the success of any preservation goals. The Arizona Site Steward Program trains and certifies stewards to monitor sites for deterioration and vandalism. Site Stewards are trained in documentation and other skills. Working closely with professional archaeologists throughout the state, they provide an invaluable service to help save our cultural heritage. Pima County could request a Site Steward monitor identified archaeological sites on a regular schedule, especially those located near popular trails, noting any natural or other changes. Interpretive signs and pamphlets, summarizing the cultural history of the park and emphasizing the fragility of archaeological sites, could be distributed via boxes at trailheads. Suggestions on how to enjoy our shared cultural heritage and underscoring the public's responsibility in helping to preserve these important sites would greatly enhance visitors' appreciation of Tucson Mountain Park.

The popularity of Tucson Mountain Park as a recreational area for local Tucsonans as well as out-of-town visitors is well known. A carefully managed program overseeing cultural resources could incorporate the monitoring of archaeological sites and historic properties using volunteers from the Arizona Site Steward Program working with qualified professional archaeologists. Preservation of the abundant cultural resources of Tucson Mountain Park will allow future generations to enjoy our shared cultural heritage.

8.15 Management Summary:

- Seventy-five percent of Tucson Mountain Park has not been surveyed for cultural resources. There is a strong possibility that significant archaeological remains are present in the unsurveyed areas. Surveying these areas should be a high priority in management plans but can be accomplished through a phased approach that allows specific areas and resources to be addressed for specific development plans.
- Forty-eight archaeological sites have been recorded within the project area. Notable cultural properties, such as Old Tucson Studios, have not been identified as historic properties although they are significant. Stabilization of some resources may be necessary.
- The creation of a GIS-based dataset to facilitate management and planning is critical to a successful master plan.

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- Arizona Site Stewards should be incorporated into monitoring efforts.
- Specific recommendations are made to re-survey previously identified archaeological and historic resources within Tucson Mountain Park with accepted modern survey standards, using GIS equipment, to determine National Register of Historic Places eligibility status and to track natural and human-caused changes to these sites.
- Architectural deterioration at the Bowen Homestead, AZ AA:16:346 (ASM), should be assessed, and if necessary, addressed. This can be done in a phased approach, with the most pressing repairs needed to ensure the safety of the public undertaken first. If repairs are deemed to be too costly at the present time, erecting fencing around the site may be necessary to prevent injury.
- Survey and recording of the numerous and diverse Civilian Conservation Corps features located in Tucson Mountain Park should be undertaken. These are known anecdotally to Park employees and are often visited by the public, but with one exception have never been officially recorded.
- At least five vertical and horizontal historic mine shafts have not been officially recorded (Gale Bundrick, personal communication, July 2007). These should be assessed, and appropriate actions taken to ensure public safety.

9.1 Introduction:

Two important features of Tucson Mountain Park are its visual prominence and the presence of iconic landscape features that define the park, the community, and the Sonoran Desert. These features, combined with limited disturbance to the landscape, result in visual resources that are of very high quality.

9.2 Visual Prominence:

The peaks and upper elevations of Tucson Mountain Park and the adjacent West Unit of Saguaro National Park are visible from virtually all vantage points within the Tucson metropolitan area. The Park serves as a dramatic backdrop for the City's urban core. Except when screened by structures, dense vegetation, or small landforms, it is visible from the vantage points as far away as the Tortolita Mountains, the Santa Catalina Mountains, the Rincon Mountains, the Santa Rita Mountains, and the Roskrige Mountains. The land area from which Tucson Mountain Park is visible encompasses approximately 1,000 square miles.

Because of this prominence, nearly everyone of the more than 1,000,000 residents of the metropolitan area has an opportunity to view portions of Tucson Mountain Park on a daily basis as they travel to work, school, or other destinations. Even air travelers arriving at Tucson International Airport, are often given a unique aerial view of the rugged peaks and colorful hues of Tucson Mountain Park.

Provided below and on the following pages are photographs from various locations throughout the community that demonstrate the visual prominence of Tucson Mountain Park.



Figure 9-A: Photo of Park from Ina Road near Santa Cruz River



Figure 9-B: Photo of Park from Saguaro National Park - West Unit

9. Visual Resources



Figure 9-C: Photo of Park from Avra Valley / Tohono O’Odham Nation (Reservation Road, South of Manville Road)



Figure 9-D: Photo of Park from State Route 86 (Ajo Highway)



Figure 9-E: Photo of Park from Downtown Tucson



Figure 9-F: Photo of Park from University of Arizona Campus

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Figure 9-G: Photo of Park from Proposed Julian Wash Linear Park



Figure 9-H: Photo of Park from hilltop west of Kolb Road / Snyder Road Intersection



Figure 9-I: Photo of Park from near Oracle Rd. / Tangerine Rd. Intersection



Figure 9-J: Photo of Park from Tortolita Mountain Park

9.3 Visual Quality - Contributing Features:

The Sonoran Desert is a unique and particularly beautiful environment. It is characterized by dramatic landforms, unusual plants, and visual elements that are found in no other location on earth. It's iconic images in many ways define Tucson, Pima County, and southern Arizona. Tucson Mountain Park is a repository of these iconic images. Collectively, they make the park a popular destination for visitors from the community and from states and countries around the globe.

Some of the features that contribute to the visual quality of Tucson Mountain Park are:

- Landforms (mountain peaks, ridges, cliffs, and outcrops)
- Plant communities (saguaro forests, ironwood forests, riparian woodlands)
- Specimen plants (saguars, ocotillo, prickly-pear)
- Spaces of various scales (broad valleys, narrow canyons, winding arroyos)
- Vibrant colors (deep brown rocks, multi-colored wildflower blossoms)
- Changing colors (saturated pre-sunset colors, subdued colors post-sunset)
- Atmospheric / light conditions (summer monsoon season sunsets)
- Rural / natural character (narrow roads, vegetation to edge of pavement)
- Limited evidence of human development (low-profile and very few buildings)
- Development that utilizes natural materials (stone walls, stone structures)

While these features contribute to the visual quality of the park individually, it is the integrated presence of all of them that make Tucson Mountain Park a place of stunning beauty. Provided below are photographs of some of these features that contribute to the visual quality of Tucson Mountain Park.



Figure 9-K: Features Contributing to Visual Quality of Park

- Golden Gate Peak and Bren Peak (left)
- Sunset from G-3 Overlook (right)

9. Visual Resources



Figure 9-K: Features Contributing to Visual Quality of Park (Continued)

- Reconstructed stone building at Gates Pass Overlook (top left)
- Bicyclist on Kinney Road (top right)
- Ocotillo specimen (middle left)
- Saguaro specimen (middle right)
- Desert wash east of Kinney Road (bottom left)
- Saguaro forest (bottom right)

9.4 Visual Quality - Negative Features:

There are a few on-site conditions that detract from the visual quality of the park. One of these is the presence of a privately owned in-holding along Gates Pass Road, the park's principal entry from the Tucson community. This in-holding includes a house, several other structures, and cleared vehicular parking areas. While somewhat screened from the road, the development associated with this property is generally incompatible with surrounding mountain park.

A second feature that impacts negatively on the visual quality of the park is the presence of overhead utility lines in locations such as along Gates Pass Road (near the eastern boundary of the park) and in the vicinity of the Kings Canyon Trailhead. These overhead lines are limited in scope and typically located where they are not visible from designated roadside pull-outs and vistas. While visual quality would improve if these overhead utilities were not in place, their impact on the experience of most park visitors is limited.

The siting of Old Tucson, below the Gates Pass Overlook, results in this facility being a visual intrusion into one of the parks' primary and very popular vistas. The presence of low-profile buildings that might have been associated with an old ranch or small western town would not have had a significant impact. The large structures, paved parking lots, and cleared operations and maintenance areas do, however, detract from the visual quality of the Gates Pass area of the park.



Figure 9-L: Private In-Holding North of Gates Pass Road



Figure 9-M: Overhead Utility Line - Gates Pass Road



Figure 9-N: Old Tucson as seen from Gates Pass Overlook (Enlarged view)

9. Visual Resources

The existing radio / television / communication towers on top of Tower Peak are visible from both the east and west side of the mountain range. These towers, and the associated beacon lights, interject an urban element into the natural setting of Tucson Mountain Park.

Population growth and associated urban development in Tucson and Pima County have and will continue to impact the visual quality of Tucson Mountain Park. The prior construction of roads and houses on the steep east face and ridge line of the mountain range near Trails End Road is an example of external development that negatively impacts the visual quality of the park.

Recent and anticipated future growth in the southwest portion of the Tucson Metropolitan area and in Avra Valley will also impact the visual resources of the park in a negative way. These areas are visible from the upper elevations of the park. From these vantage points homes and other buildings are now clearly visible. The scope and visibility of this development will increase in the years to come.



Figure 9-O: Tower Peak Area as seen from Trails End Road



Figure 9-P: Existing Development Southwest of Park as seen from Gates Pass

10. Existing Infrastructure

10.1 Introduction: The existing infrastructure within Tucson Mountain Park includes a system of roads that support public and emergency access and utility systems that support the leased facilities and public use areas within the park. A system of signs is also present to identify facilities and provide information related to the public's use of the park.

10.2 Park Roads: Gates Pass Road, Kinney Road, and McCain Loop Road are the only public streets within the boundaries of Tucson Mountain Park. All of these roads are two-lane paved streets that are maintained by the Pima County Department of Transportation.

Gates Pass Road:

Gates Pass Road extends west from the City of Tucson into the Tucson Mountain range, crossing the ridge line at the Gates Pass Overlook. It continues down the western slope of the mountains and terminates at Kinney Road near Old Tucson. The road profile is steep and the alignment includes numerous curves. There are very narrow or no paved shoulders. In many locations, such as west of the Gates Pass Overlook, there are steep cliffs adjacent to the road.

The volume of motor vehicle traffic on Gates Pass Road is significant and it is increasing. Traffic counts were taken in conjunction with this project near the location where Gates Pass Road enters the park. The results of this count, and the results of a previous count taken by the Pima Association of Governments (PAG) are as follows:

Gates Pass Road - 2007 Average Daily Traffic (ADT)	4,200
Gates Pass Road - 1997 Average Daily Traffic (ADT)	2,400

Motorists use this road for both access to park facilities and for commuting to and from various destinations in the Tucson metropolitan area. The weekday traffic volume (ADT = 4,274) is slightly higher than the weekend traffic (ADT = 4,164).

Gates Pass Road also receives a substantial volume of on-street bicycle traffic. The narrow width of the roadway and the lack of a paved shoulder create hazardous conditions when cars, trucks, and bicycles pass along this narrow corridor.

Kinney Road:

Kinney Road extends through the Tucson Mountain Park west of the mountain range. It provides access to the Arizona-Sonora Desert Museum, Old Tucson, and many of the day-use facilities within the park. The profile of the road is generally flat but there are several abrupt dips in the road as it crosses through natural drainageways. The road alignment has numerous curves with limited sight distances. There are very narrow or no paved shoulders along Kinney Road.

10. Existing Infrastructure

Some of the Kinney Road motor vehicle traffic enters the park at the north or south entry and exits at the opposite end. The remainder makes a connection to Gates Pass Road.

The volume of motor vehicle traffic has grown significantly in the past decade. Traffic volumes, recorded as part of this project and as published by the Pima Association of Governments, are as follows:

Kinney Road at South Entry - 2007 Average Daily Traffic (ADT) 3,800
Kinney Road at South Entry - 1997 Average Daily Traffic (ADT) 1,400

The current traffic volume at the south entry is slightly higher on weekdays (ADT = 3,913) than on weekends (ADT = 3,540).

Kinney Road at North Entry - 2007 Average Daily Traffic (ADT) 2,900
Kinney Road at North Entry - 1997 Average Daily Traffic (ADT) 2,200

The current traffic volume at the north entry is slightly higher on weekdays (ADT = 3,051) than on weekends (ADT = 2,414).

Kinney Road receives a significant volume of on-street bicycle traffic. The lack of paved shoulders, combined with the increased volume of motor vehicle traffic can create hazardous conditions when vehicles and bicycles pass along the narrow corridor.

McCain Loop Road:

McCain Loop Road is two-lane paved roadway that is wholly within Tucson Mountain Park. It provides access to the Gilbert Ray Campground and access to the Arizona-Sonora Desert Museum service gate. McCain Loop Road is frequently used as a route for low-speed scenic drives.

Traffic volumes on McCain Loop Road were not measured as part of this project and the Pima Association of Governments does not have historic traffic data for this street.

Roadside Pull-Outs:

Roadside pull-outs are provided along Kinney Road and Gates Pass Road. Information related to these pull-outs is included in Section 14 of this Report.

Well Road:

The Well Road is an unpaved service drive that connects the well site on the west side of the park with storage tanks at Gilbert Ray Campground. This road is closed to all vehicles except authorized Pima County Natural Resource, Parks, and Recreation vehicles and emergency vehicles. The Well Road is used as a hiking, mountain bicycle, and equestrian trail.

10. Existing Infrastructure

10.3 Planned Improvements to Park Roads:

The Pima County Department of Transportation maintains and periodically resurfaces the public roadways within Tucson Mountain Park. The department does not, however, have any projects to widen or improve these roads in its current capital improvement program.

10.4 Planned Improvements to Area Roads

The Arizona Department of Transportation is currently planning capacity and safety improvements to be constructed along State Route 86 (Ajo Way) south of the park. A higher volume of traffic on SR 86, combined with population growth southwest of the park, has the potential to increase traffic on Kinney Road as it passes through the park.

The Pima County Regional Transportation Authority (RTA) does not have, on its list of projects to be implemented over the next twenty years, any projects in the immediate vicinity of Tucson Mountain Park. Improvements to Sandario Road, which runs west of the park and allows some traffic to by-pass the park, are not planned at this time.

Local roadway improvements that will be funded with monies from sources other than the RTA include a realignment of portions of Bopp Road and improvements to Kinney Road, north of Ajo Way. The Kinney Road improvements are being implemented in conjunction with the construction of a Wal-Mart store planned for the subject intersection.

10.5 Park Water System

The Pima County Natural Resources, Parks, and Recreation Department owns and operates a water supply well that delivers water to the Arizona-Sonora Desert Museum, Old Tucson, the Gilbert Ray Campground, and several other facilities within Tucson Mountain Park.

Production Well:

The production well (Arizona Department of Water Resources Registration Number 55-587814) is located along the western boundary of the park in Section 13 (T14S-R11E). (See Figure 10-B). The well was drilled in 2001 and is 727 feet deep. It is equipped with a 60 hp submersible pump with a capacity of 250 gpm. The pump is set at a depth of 630 feet below the surface. The static water level in the well is approximately 420 feet.

The production well discharges into a 150,000 gallon above-ground steel water storage tank located at the well site. There is also a 10,000 gallons above-ground steel storage tank at the well site.

Pipeline from Well to Gilbert Ray Campground:

Water is pumped from the well site to the Gilbert Ray Campground with two 30 hp centrifugal pumps. The 2.5 mile long pipeline consists of a 6" diameter PVC pipe that was installed in early 1970's. Telephone lines between the campground and the well site are used to control the pumps. These phone lines were also installed in the 1970's and are in frequent need of repair.

10. Existing Infrastructure

Water delivered to the Gilbert Ray Campground site is stored in two above-ground water storage tanks, one 50,000 and the other 40,000 gallon in size. From this site, water is delivered to the campground and pumped to both the Arizona-Sonora Desert Museum and Old Tucson.

Pipeline to the Arizona-Sonora Desert Museum:

A 6" diameter line under Kinney Road delivers water to the Desert Museum. The pipeline is PVC with ductile iron sections at wash crossings. The length of the line is approximately 2.5 miles. Pumps at the campground and a hydro-pneumatic tank are part of this delivery system. At the museum, the water is stored in two underground tanks, a 50,000 gallon tank for fire protection and a 25,000 gallon tank for domestic use. These storage tanks and the downstream distribution system belong to the museum and are not operated or maintained by Pima County.

The pipeline between the campground and the Desert Museum is in poor condition and has sustained numerous breaks in recent years. The possible replacement of this line is currently being evaluated by Pima County.

Pima County's lease agreement with the Arizona-Sonora Desert Museum requires the County to provide water to the Desert Museum to the extent that the existing infrastructure will allow.

Pipeline to Old Tucson:

Pumps at the Gilbert Ray Campground and a 6" diameter PVC pipeline convey water to Old Tucson through undeveloped portions of the park. This pipeline is approximately 0.74 miles in length. At the Old Tucson site, water is stored in a 100,000 gallon fire protection reservoir and a 50,000 gallon domestic water reservoir. All water lines, storage tanks, and distribution lines on the Old Tucson site are operated and maintained by Old Tucson.

The pipeline to Old Tucson is in poor condition and Pima County is currently evaluating its possible replacement.

Pima County's lease agreement with Old Tucson requires the County to provide water to Old Tucson to the extent that the existing infrastructure will allow.

Other Facilities with Potable Water Connections:

The pipelines to the Desert Museum and to Old Tucson provide water to the Field Office (the Carither's House), the restroom at the Juan Santa Cruz Picnic Area, and the restroom at the Archery Range.

10. Existing Infrastructure

Water Well at Sonoran Arthropods Studies Inc. Site:

There is an existing water well at the site leased by Sonoran Arthropods Studies Inc. (SASI). This well produces water of very low quality that cannot readily be treated to comply with applicable potable water standards.

10.6 Other Water Facilities within or near the Park:

Tucson Water currently has an above-ground water storage reservoir within the park. This reservoir is approximately 0.7 miles northeast of the Kinney Road south entry to the park in Section 23 (T14S-R12E). It is accessed via an unpaved road extending north from the Tucson Estates subdivision. (See Figure 10-B). Water from this reservoir is not delivered to any facilities within Tucson Mountain Park.

Tucson Water also maintains the Clearwater Reservoir which is located off park property near the Starr Pass Trailhead. This large above-ground reservoir is connected to the water utility's Central Arizona Project Treatment facility in Section 25 (T14S-R12E). It is connected by a deep underground conduit that was drilled through the Tucson Mountains. Water from the Clearwater Reservoir is not delivered to facilities within Tucson Mountain Park.

The Central Arizona Project Tucson Aqueduct extends through the Wildlife Mitigation Corridor. In accordance with various agreements / contracts, the untreated water in the canal cannot be delivered directly to end users.

10.7 Park Electrical System:

Overhead lines operated by the Trico Electrical Cooperative provide electrical power to the well site, the Gilbert Ray Campground (and associated maintenance compound), the Arizona-Sonora Desert Museum, Old Tucson, and the site leased by Sonoran Arthropods Studies Inc.. The in-park electrical power distribution system also extends to the radio transmission towers on Tower Peak, to the water storage facility north of Tucson Estates, and through the southeastern portion of the park, north of State Route 86. (See Figure 10-B).

The Trico Electrical Cooperative distribution system consists of overhead electric lines on wood poles. These poles are nearing the end of their useful life-cycle and it is anticipated that they will be replaced within the next few years. Trico is also planning to upgrade the portion of its system that extends to Tower Peak, from single-phase to 3-phase, to enhance the reliability of the system. This upgrade will likely be implemented when the wooden poles are replaced.

The local electrical power distribution systems at the Arizona-Sonora Desert Museum, Old Tucson, and the Gilbert Ray Campground are underground.

10.8 Electrical Power Distribution Systems in the Vicinity of the Park:

In addition to the electrical power distribution system within the park, the Trico Electrical Cooperative has overhead lines that run along that portion of the Sandario Road right-of-way that abuts the CAP Wildlife Mitigation Corridor. This line is scheduled to be replaced / upgraded by the middle of 2009.

10. Existing Infrastructure

Tucson Electric Power (TEP) does not provide electricity to the park, but does provide power to users southwest of the park. With urban growth in this growing service area, Tucson Electric Power is planning a new 138 KV transmission line. Preliminary routing options being considered by TEP as of August 2007 include corridors that would extend through or south of Tucson Mountain Park. Tucson Electric Power anticipates that it will have secured the necessary right-of-way and completed construction of this transmission line by 2013.

Pima County is opposed to any electrical transmission line that extends through the park. The County would only consider approval of a new utility transmission line within the park if the subject line were to be installed underground, along a corridor selected by the Natural Resources, Parks, and Recreation Department, with adequate mitigation provided for all construction impacts.

Tucson Electric Power staff also discussed a potential future project involving the installation of an overhead, high-voltage power line within the Central Arizona Project canal right-of-way. This is similar to a proposal made by the Public Services Company of New Mexico (PNM) in 2000. The proposal was eventually withdrawn after significant negative comment. The Pima County Board of Supervisors and the Pima County Parks and Recreation Commission both passed resolutions opposing the PNM proposal.

Pima County will oppose any proposed utility corridor that directly impacts, is adjacent to, or that bisects Tucson Mountain Park.

10.9 Telephone Service:

Qwest Communications provides telephone service to Old Tucson, the Gilbert Ray Campground, and the Arizona-Sonora Desert Museum. Telephone service is via an underground cable that extends north, from the south entry of the park to the museum along the Kinney Road right-of-way. Qwest does not currently have any plans to upgrade or expand their land-line phone system within the park.

As noted above, there is also a private telephone line between the well site and the campground that is used to control the well pumps. This line is in poor condition.

10.10 Sanitary Sewage Systems:

There are no sanitary sewers on the Tucson Mountain Park site. Sewage treatment at County maintained facilities is addressed as follows:

Gilbert Ray Campground:	Sewage Lagoon
Archery Range	Septic Tank / Leach Field System
Juan Santa Cruz Picnic Area Restroom	Septic Tank / Leach Field System
Site Leased by SASI	Septic Tank / Leach Field System
Field Office Building	Septic Tank / Leach Field System
Ironwood Picnic Area Restroom	Pumped Vault System
Shooting Range Restroom	Pumped Vault System

10. Existing Infrastructure

As of the date of this report, all of these facilities are appropriately sized, are working correctly, and are in compliance with applicable Pima County Department of Environmental Quality and Arizona Department of Environmental Quality standards.

10.11 Natural Gas Pipelines:

The El Paso Natural Gas Company owns and operates two parallel underground natural gas transmission lines that extend through the Wildlife Mitigation Corridor on the western edge of the park. (See Figure 10-B). These natural gas pipelines are long-distance transmission lines and not part of the local distribution system.

The El Paso Natural Gas Company anticipates the construction of a third parallel underground line adjacent to its existing facilities. Currently, there is no schedule for the construction of the additional pipeline.

El Paso Natural Gas personnel routinely drive the pipeline corridor to inspect the pipeline. Locked gates have been provided at the locations where the pipeline enters and exits the Mitigation Corridor. An unpaved road is maintained to allow for these mandated inspections.

El Paso Natural Gas also has underground natural gas pipelines within the Robles Pass Trails Park portion of the Park. (See Figure 10-B).

10.12 Park Signs:

There are a variety of signs within Tucson Mountain Park including park entry signs, leased facility entry signs, park facility identification signs, roadway informational signs, and public use regulation signs. There is no comprehensive system for the identification of trails within the park.

Positive features related the park's existing sign system include; the quantity of signs has been kept to a minimum, the size of the signs has been minimized so as to be unobtrusive, and most of the materials (routed wood, stone, etc.) are generally compatible with a natural setting.

Negative features related to the existing sign system include inconsistency of materials, inconsistency of graphic presentation, outdated information (name on signs has not been updated to reflect new name of the department), poor appearance due to wear-and-tear and vandalism, an insufficient quantity of signs with park-use regulations, and an absence of signs related to the park's trail system. Provided below are photographs illustrating the range and condition of existing park signs.

10. Existing Infrastructure



Figure 10-A: Photographs of Existing Park Signs

10. Existing Infrastructure

10.13 Perimeter Fencing:

Portions of the Tucson Mountain Park boundary have been fenced with three-wire fencing. In other locations, boundary markers have been installed to identify the limits of the park. In still other locations, there is no fencing or permanent markers at the current park boundary. (See Figure 10-C).

The Wildlife Mitigation Corridor on the west side of the park is completely fenced. The fencing in this area includes gates as needed for access to the El Paso Natural Gas pipeline corridor. This fence is regularly inspected and maintained in accordance with the Cooperative Management Agreement between Pima County and the Bureau of Reclamation.

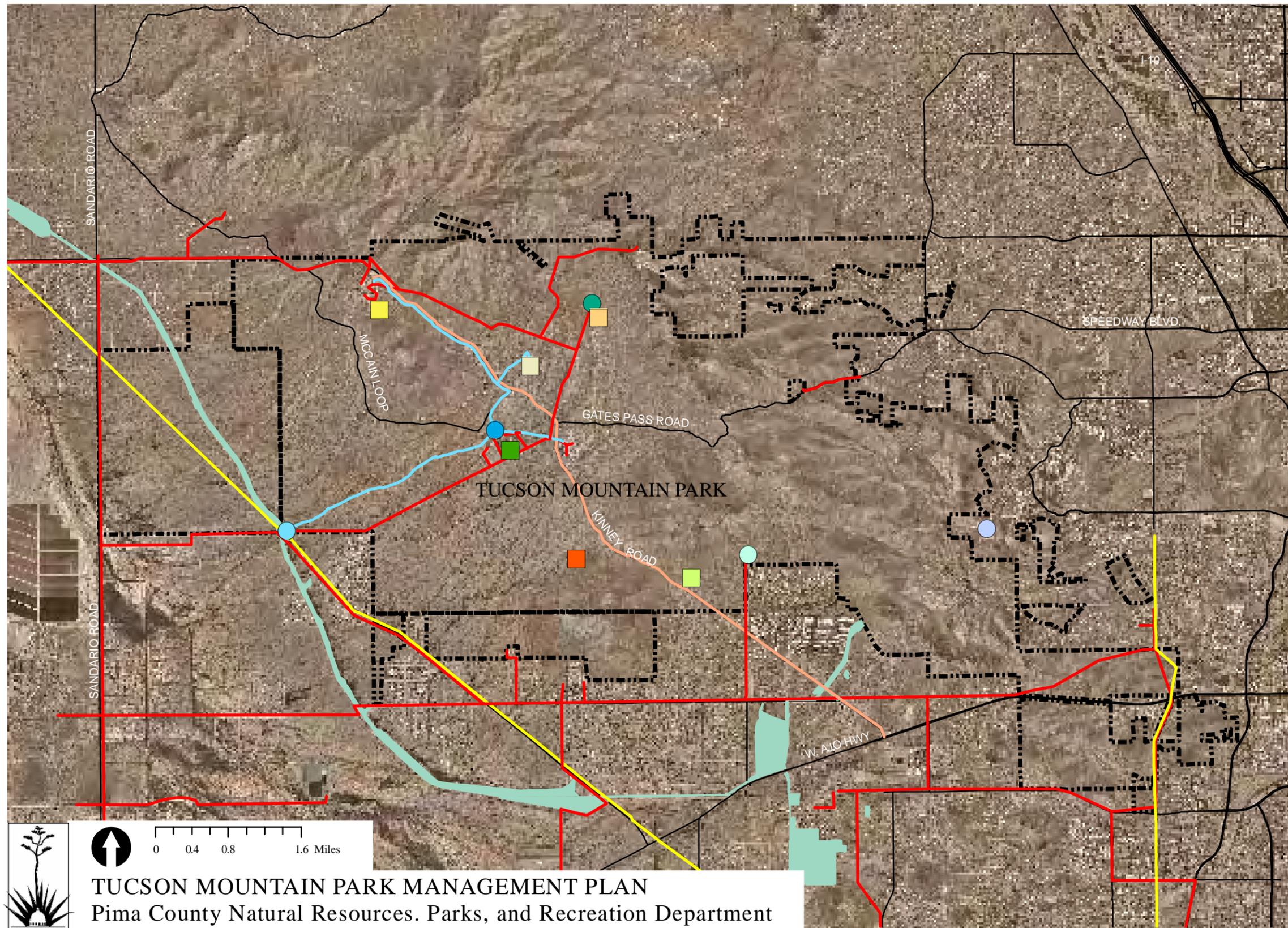
There is existing fence along most of the park boundary at the south and southeast limits of the park where the boundary has not changed in recent years. The status of the fencing at the perimeter of the BLM Site Expansion Area is unknown and will need to be checked when the subject property is conveyed to Pima County. Similar conditions exist at the Robles Pass Trails Park site. Fencing at old property lines in and around the Robles Pass site may be present. The condition of this fencing is unknown. Continuous fencing at the boundary of lands now owned by Pima County does not currently exist.

The current park boundary in the vicinity of 36th Street, Starr Pass, Camino de Oeste, and Trails End Road is not typically fenced. This is due to a number of recent acquisitions and dedications that have changed the boundary location in these areas.

The National Park Service maintains a fence along the common boundary between Tucson Mountain Park and Saguaro National Park. The primary purpose of this fence is to demarcate the property line. Vehicle access control is not of primary concern as there is limited opportunity for vehicle incursion due the rugged terrain along the subject boundary line.

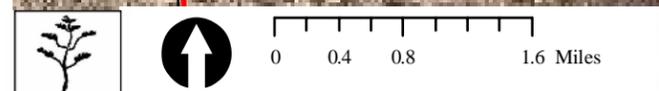
TUCSON MOUNTAIN PARK

FIGURE 10-B
EXISTING UTILITIES



LEGEND

- PARK WATER PRODUCTION WELL, STORAGE TANK, AND PUMPING FACILITIES
- PARK WATER STORAGE TANKS AND PUMPING FACILITIES
- NON-POTABLE WELL AT S.A.S.I. SITE
- TUCSON WATER ABOVE GROUND STORAGE TANK
- TUCSON WATER CLEARWATER RESERVIOR
- GILBERT RAY CAMPGROUND SEWAGE LAGOON
- JUAN SANTA CRUZ PICNIC AREA SEPTIC SYSTEM
- ARCHERY RANGE SEPTIC SYSTEM
- S.A.S.I. SITE SEPTIC SYSTEM
- IRONWOOD PICNIC AREA VAULT TOILET
- SHOOTING RANGE VAULT TOILET
- POTABLE WATER MAIN
- OVERHEAD ELECTRIC LINE
- NATURAL GAS TRANSMISSION PIPELINE
- UNDERGROUND TELEPHONE
- CENTRAL ARIZONA PROJECT CANAL / PIPELINE RIGHT-OF-WAY



TUCSON MOUNTAIN PARK MANAGEMENT PLAN
 Pima County Natural Resources, Parks, and Recreation Department
 Prepared by McGann & Associates Landscape Architects and Planners

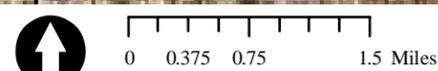
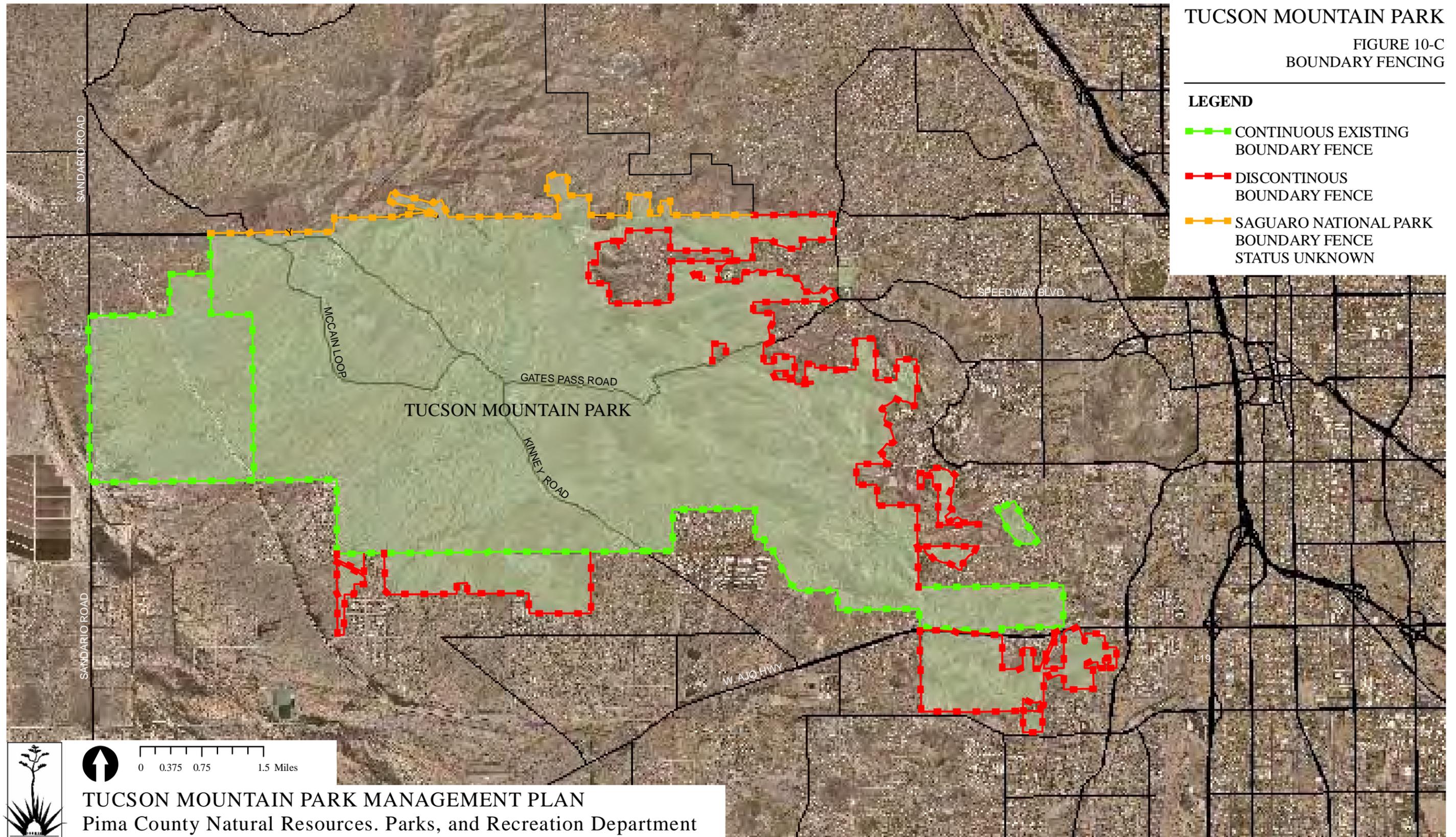


TUCSON MOUNTAIN PARK

FIGURE 10-C
BOUNDARY FENCING

LEGEND

-  CONTINUOUS EXISTING BOUNDARY FENCE
-  DISCONTINUOUS BOUNDARY FENCE
-  SAGUARO NATIONAL PARK BOUNDARY FENCE STATUS UNKNOWN



TUCSON MOUNTAIN PARK MANAGEMENT PLAN
Pima County Natural Resources, Parks, and Recreation Department
Prepared by McGann & Associates Landscape Architects and Planners

11. Operations and Maintenance Facilities

11.1 Introduction:

Tucson Mountain Park has two facilities that support on-going park operation and maintenance activities. The principal facility is a small compound located adjacent to the Gilbert Ray Campground. The second is a residential structure that has been converted to serve as a field office for park operations and volunteer programs.

11.2 Maintenance Compound:

The Tucson Mountain Park maintenance compound occupies a site less than one acre in size located near the entrance to the Gilbert Ray Campground. (See Figure 11-A). Access to the site is via McCain Loop Road and the campground entry drive. The site is enclosed with a combination of masonry walls and fences. Within the compound there are two above-ground, steel, water storage tanks, with capacities of 40,000 and 50,000 gallons respectively. Also present is a masonry building that houses some of the equipment used to pump water from these tanks to the Arizona-Sonora Desert Museum and Old Tucson.

The original pump building has been modified with several additions. Enclosed in these additions are a small shop, a small employee break / meeting room, and a small office for the on-site foreman. There are no restrooms in the building. The facility is not ADA (Americans with Disabilities Act) compliant due to steps and other barriers.

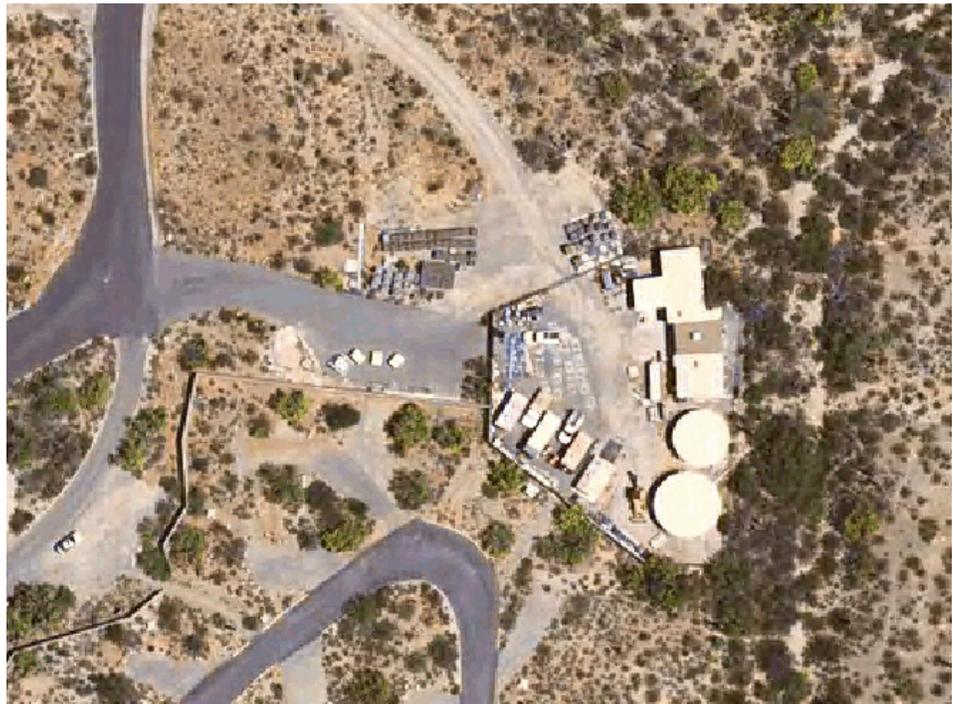


Figure 11-A: Aerial Photograph of the Operations and Maintenance Compound

11. Operations and Maintenance Facilities

The on-site building does not provide adequate space for materials and equipment storage. In an effort to provide secure on-site storage, several steel shipping containers have been purchased and delivered to the operations and maintenance compound site. Durable materials and equipment that do not fit in these shipping containers are stored outside on a partially paved lot.

The operations and maintenance compound also includes various utility system components including hydro-pneumatic tanks and electrical switchgear.

In recent years, various materials and equipment have been stolen from the compound due to the lack of adequate, secure storage space. An adequately sized, low-profile building for storage, equipment repair, safety programs, and other related activities would significantly enhance the County's ability to efficiently operate and maintain the various facilities at Tucson Mountain Park.



Figure 11-B: Photograph of Entry to Maintenance Compound

11. Operations and Maintenance Facilities

Facility: Operations and Maintenance Compound

Description	Date Constructed / Renovated	Existing Condition	Potential Improvements
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Access

Access Road	McCain Loop Road		
Internal Road	Access drive from Campground Entrance Road	Routinely graded	Fair Paving of entry drive
Parking Lots	Partially paved parking area and equipment storage yard	Routinely graded	Fair Paving of parking area for dust control
Fencing and Gates	Perimeter masonry wall and fence w/ locking main gate	Various	Good

Utilities:

Water System	On-site water tanks and local piping / hydrants for maintenance activities	Various	
Sanitary Sewer	None		
Electrical Service	Provided by Trico Electric Co.. Service is overhead line to pump building	1985	Good
Telephone Service	Telephone services from underground Qwest line in Kinney Road		

Buildings:

Pump Station / Shop	Masonry building with multiple additions and modifications	Various	Poor New ADA compliant building to house shops, staff room, rest room, material storage, etc.
Storage Facilities	Multiple shipping containers with roof / walls between adjacent units		Poor Removal and replacement with new building

11. Operations and Maintenance Facilities

11.3 Field Office:

Due to the space limitations within the operations and maintenance compound, an existing residential structure, located adjacent to Kinney Road near the entrance to the Arizona-Sonora Desert Museum, has been remodeled to serve as a park field office. (See Figure 11-C). This structure was previously occupied by an employee of the Arizona-Sonora Desert Museum and is sometimes referred to as the Carither's House.



Figure 11-C: Aerial Photograph of Field Office

The renovated building includes basic restroom and kitchen facilities. The balance of the space consists of office space, meeting rooms, and storage areas. The structure is not ADA compliant and it would be difficult to bring in to compliance due to varying floor elevations, steps between rooms, and narrow doorways in the stone structure. Site improvements include a small parking lot, a masonry wall along the Kinney Road frontage, and gated entry drive.

The field office is used for volunteer orientation and safety programs, for volunteer program office space, and similar functions. The size and type of meetings that can be conducted at the field office is limited due to the size of the parking lot and ADA non-compliance.

11. Operations and Maintenance Facilities



Figure 11-D: Photograph of Field Office Building

Facility: Field Office (Carithers' House)

Description	Date Constructed / Renovated	Existing Condition	Potential Improvements	
Access				
Access Road	Kinney Road	Good		
Parking Lot	Small parking lot located in front of house for staff	1998	Good	
Fences and Gates	Metal gate	2007	Good	
Utility Systems				
Water System	Supplied via the Gilbert Ray distribution system. Water line crosses Kinney Road in front of the house to a 1000 gallon storage tank behind the house	2006	Good	Evaluate the old underground storage facility (on the hill) behind the house for historic purposes
Sanitary System	Septic System	1995	Good	
Electrical Service	Provided by Trico Electric Co. Service is from an overhead connection located behind the house	1985	Good	Evaluate possible removal of the overhead electrical line that once served the booster pump behind the house. Line no longer needed.
Telephone Service	Phone service provided by an underground line in Kinney Rd.			

11. Operations and Maintenance Facilities

11.4 Off-Site Facilities:

The Pima County Natural Resources, Parks, and Recreation Department operates a central maintenance facility adjacent to its headquarters building at 3500 West River Road in Tucson. This facility includes service garages and repair shops. It is staffed by mechanics and technicians that can be assigned, as-needed, to assist with the maintenance and repair of vehicles and equipment used at Tucson Mountain Park. The central maintenance facility is approximately 16 miles from the park's operations and maintenance compound. The Department's headquarters building also includes office space for the Tucson Mountain Park Manager.

12.1 Introduction:

There are three leased facilities within the boundaries of Tucson Mountain Park. These are the Arizona-Sonora Desert Museum (ASDM), Old Tucson Studios, and the Sonoran Arthropod Studies, Inc. (SASI). These facilities are operated by private entities under contract with Pima County. The Pima County Department of Economic Development and Tourism and the Pima County Natural Resources, Parks, and Recreation Department are responsible for on-going coordination with the lessees.

The scope of the Management Plan project did not include a review of the various improvements that exist on the leased properties or an analysis of their operations. Accordingly, detailed information on the scope and condition of these facilities is not included in this Background Report. What it included is general information related to the activities conducted at these sites, the current lease between Pima County and the lessees, and the relationship of the facilities to the mission and purpose of Tucson Mountain Park.

12.2 Arizona-Sonora Desert Museum

The Arizona-Sonora Desert Museum is a world-renowned zoo, natural history museum, and botanical garden with exhibits related exclusively to the fauna, flora, geology, and cultural history of the Sonoran Desert. The museum's collections include:

- 106 mammals of 31 taxa
- 241 birds of 72 taxa
- 361 reptiles of 86 taxa
- 122 amphibians of 23 taxa
- 10,700 fish of 9 taxa
- 840 arthropods of 78 taxa
- 40,000 plant specimens representing 1,300 species
- 14,095 gem, mineral, and fossil specimens

The museum's plant and animal collection includes 20 endangered or threatened native species and several hundred rare species.

The Arizona-Sonora Desert Museum was founded in 1952 as a cooperative endeavor between William Carr and Pima County. William Carr, a naturalist, moved to Tucson in 1944 and became concerned about the public's lack of knowledge related to the desert. He envisioned a unique facility where native plants and animals were exhibited in their natural setting. This vision became the model for the development of the museum. It has subsequently become the model for similar institutions world-wide.

The museum is open to the public for the viewing of its exhibits and collections. It also is involved in research, the conservation of Sonoran Desert plants and animals, educational programming, and out-reach to other organizations and agencies. The Arizona-Sonora Desert Museum operates with funds from visitor admission fees, membership dues, contributions, and grants.

12. Leased Facilities

Visitation at the museum in 2006 was approximately 444,000. Included were visitors from throughout the United States and from countries throughout the world.

The museum is located on 95 acres of land owned by Pima County within the boundaries of Tucson Mountain Park. The facility is located in Section 1 (T14S-R11E) and Section 6 (T14S-R12E). It is operated under a Cooperative Management Agreement between Pima County and the Arizona-Sonora Desert Museum Inc. The term of the current agreement is 25 years, extending from October 2003 through September 2028. Rent is \$10.00 per annum.

Under this agreement, Pima County is obligated to provide water to the museum. The museum is responsible for the operation and maintenance of the on-site facilities and for the funding of all new capital improvement projects. The agreement also includes various other provisions related to hours of operation, concessions, special events, and other activities.



Figure 12-A: Photograph - Arizona-Sonora Desert Museum Entry

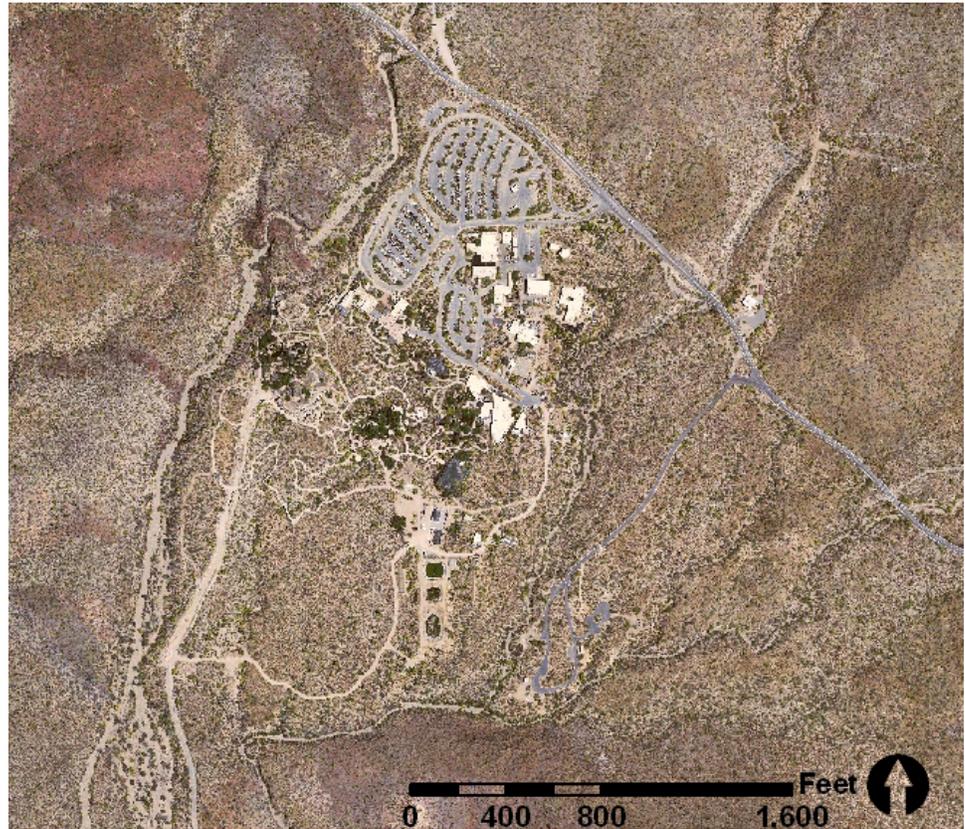


Figure 12-B: Aerial Photograph - Arizona-Sonora Desert Museum Site

12.3 Old Tucson Studios

Old Tucson Studios was constructed in 1939 by Columbia Pictures as a facility for the production of western theme movies. It continued to be used for this purpose for the next 56 years. In addition to movie production, the public was invited to tour the facility and attend shows on a fee basis. The facility is operated by a private concessionaire under contract with Pima County.

In 1995, a major fire burned many of the buildings to the ground. The park was rebuilt by the concessionaire and it reopened in 1997 as a western theme amusement park. While it is still used in conjunction with the production of an occasional movie, this activity is no longer the emphasis of the park.

As currently operated, paid visitors are able to walk the streets of an old-western town, interact with staff dressed in western costumes, observe staged shoot-outs, attend musical shows, and dine in various restaurants. The park also stages special concerts and events at Halloween and at other times of the year. Individuals and organizations can also rent facilities at the park for weddings, meetings, and other events. Annual visitation at Old Tucson in 2006 was approximately 228,000.

The Old Tucson Studios site is located at the southeast corner of Gates Pass Road and Kinney Road in Sections 9, 16, and 17 (T14S-R12E). Pima County leases the 360 acre site and the related facilities and improvements to the Old

12. Leased Facilities

Tucson Company, an Arizona Corporation. Under the terms of this lease, the lessee is permitted to use 180 acres of the overall 360 acre site. The term of the current lease extends through December 2023.

The rent paid to Pima County by the Old Tucson Company includes a “minimum rent” of \$50,000 annually plus a “percentage rent” based on the gross revenues of the park. The percentage rent is based on the following schedule.

Gross revenues less than \$5 million	0%
Gross revenues \$5 - \$6 million	2%
Gross revenues \$6 - \$7 million	4%
Gross revenues \$7 - \$8 million	6%
Gross revenues \$8 - \$9 million	8%
Gross revenues \$9 - \$15 million	10%
Gross revenues exceeding \$15 million	5%

Under the terms of the agreement, Pima County is obligated to provide potable water to the Old Tucson site. The lessee is required to provide all other utility services. The lessee is also responsible for the operation and maintenance of on-site buildings, utility systems, and other improvements.

Also included in the agreement are various provisions regulating the type of event that can be held at the park and the hours during which they may be conducted.



Figure 12-C: Photograph of Old Tucson Studios Entry

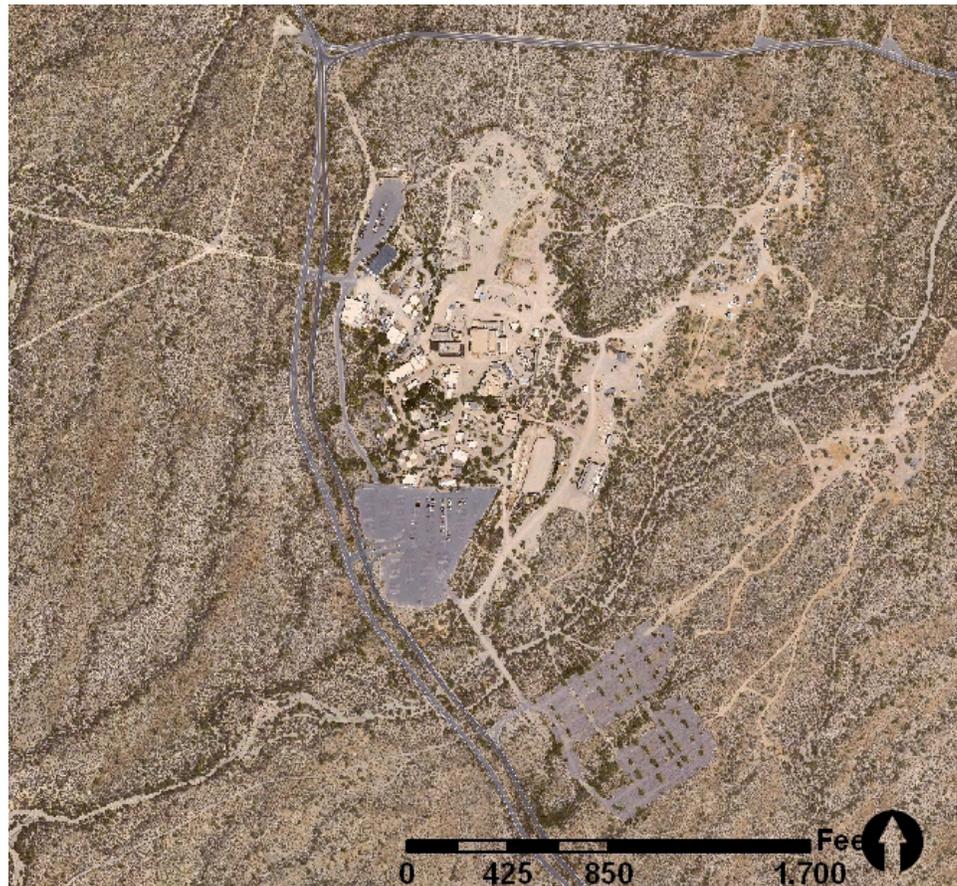


Figure 12-D: Aerial Photograph of Old Tucson Studio Site

12.4 Sonoran Arthropods Studies Inc.

Sonoran Arthropods Studies Inc. (SASI) is a non-profit organization established under Section 501(c)(3) of the United States Revenue Code. SASI is engaged in entomological research and natural resource training for the benefit of its members and for the benefit of the public participating in SASI sponsored programs.

SASI occupies a small complex which includes two principal buildings and several small structures. One of the buildings is used as a residence for an on-site staff member. The other is being used as a laboratory / meeting / office facility. These buildings are located north of Gates Pass Road and east of Kinney Road in Section 4 (T14S-R12E). An unpaved road provides access to the site. This road intersects with Gates Pass Road at roadside pull-out G-10.

All of the facilities and improvements at the subject complex are owned by Pima County and leased to SASI. The term of the current lease is from September 2004 through June of 2009. The annual rental rate is \$10.00 per year. The tenant is responsible for maintenance of the premises and is prohibited from making modifications or additions to the facilities without the consent of Pima County.

12. Leased Facilities

The nature of the activities that can be conducted at the site is limited by the lease to research, training, and related educational programs. The lease does not require SASI to meet any specific performance standards for the completion and/or publication of research results. Similarly, it does not require SASI to conduct a minimum number of programs that are open to the public.

The entry drive to the facility is gated and the public is prohibited from entering and using those park areas in the vicinity of the complex. Public use of the facility is limited to participation in environmental education programs as scheduled and conducted by SASI staff. These sessions typically occur on a monthly basis. Attendance is limited to 10-15 persons due to the size of the meeting rooms and other facilities. Annual public visitation to the SASI complex is estimated to be less than 200 persons per year.

There is an existing well at the SASI site, but the water is not potable. Overhead lines provide electricity to the buildings on-site.



Figure 12-E: Photograph of Entry to SASI Complex

12. Leased Facilities



Figure 12-F: Photograph of Buildings at SASI Complex

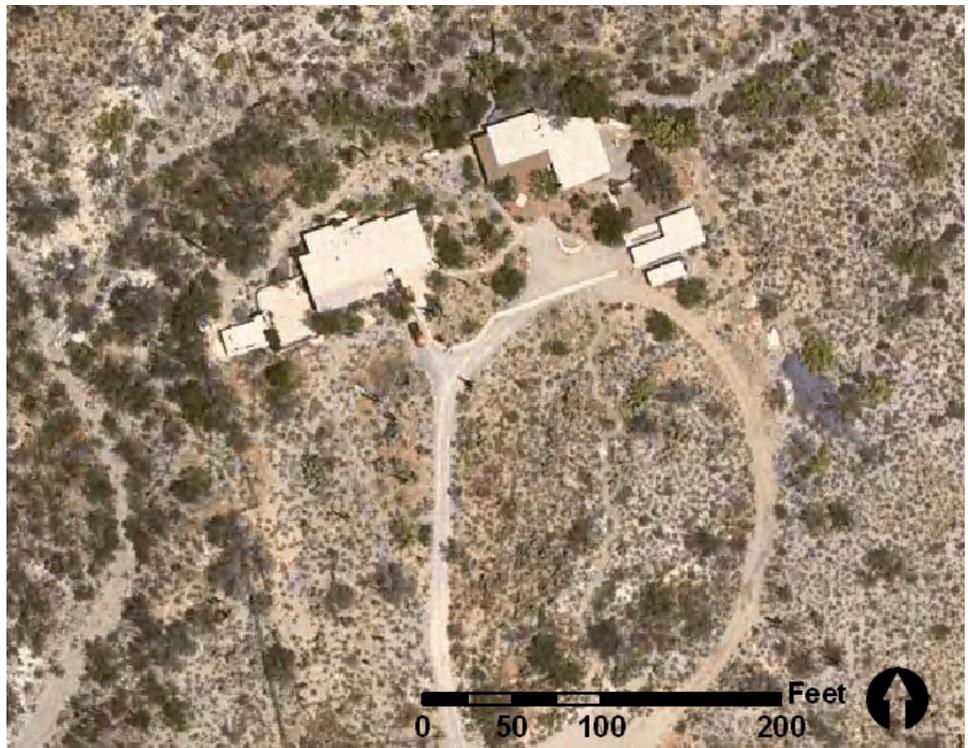


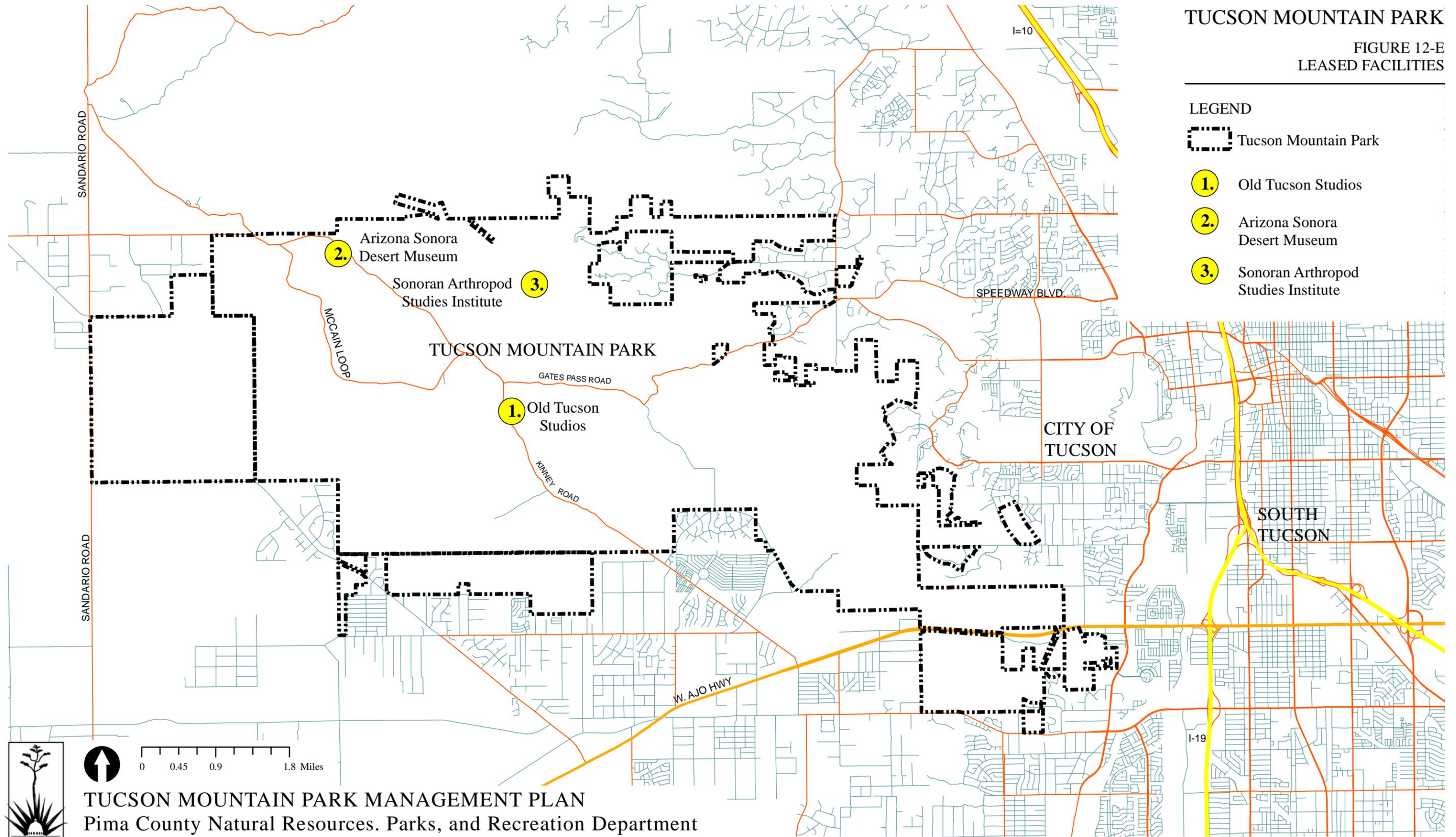
Figure 12-G: Aerial Photograph of SASI Complex

TUCSON MOUNTAIN PARK

FIGURE 12-E
LEASED FACILITIES

LEGEND

-  Tucson Mountain Park
-  1. Old Tucson Studios
-  2. Arizona Sonora Desert Museum
-  3. Sonoran Arthropod Studies Institute



0 0.45 0.9 1.8 Miles

TUCSON MOUNTAIN PARK MANAGEMENT PLAN
Pima County Natural Resources, Parks, and Recreation Department

Prepared by McGann & Associates Landscape Architects and Planners

13. Public Use Facilities

13.1 Introduction:

There are six sites within Tucson Mountain Park that have been developed with facilities for day use and one overnight campground. Included within these sites are access drives, parking areas, restrooms, and various other structures. Utilities have been extended to some of these locations. Natural vegetation has been retained at all of these sites providing a natural, Sonoran Desert character.

13.2 Gates Pass Overlook:

The Gates Pass Overlook is a Tucson landmark and the most popular destination for visitors to the park. It is readily accessible via Speedway Boulevard and Gates Pass Road and is widely considered to be a premier vantage point for viewing spectacular desert sunsets. (See Figure 13-R). Local residents, guests of local residents, and other tourists arrive daily to observe this natural light show. Visitation is not limited to the hours before and after sunset. Visitors stop at this location from dawn to dusk to view and photograph the mountain ridges, valley floor, saguaro forest, and framed city vistas that this site has to offer.

In response to the popularity of the Gates Pass Overlook, the facility was expanded and improved in 1999. This construction project resulted in safer access from Gates Pass Road, expanded parking areas, accessible walkways to overlook locations, a restored look-out building, a new restroom, and new interpretive displays. The site walls and structures associated with this project utilized native stone in a style similar to the CCC buildings constructed within the park in the 1930's.

In 2005, various roadway safety improvements were constructed on the section of Gates Pass Road that extends west from the overlook. These improvements were designed to enhance motor vehicle traffic safety for visitors traveling to or from the overlook from the west.

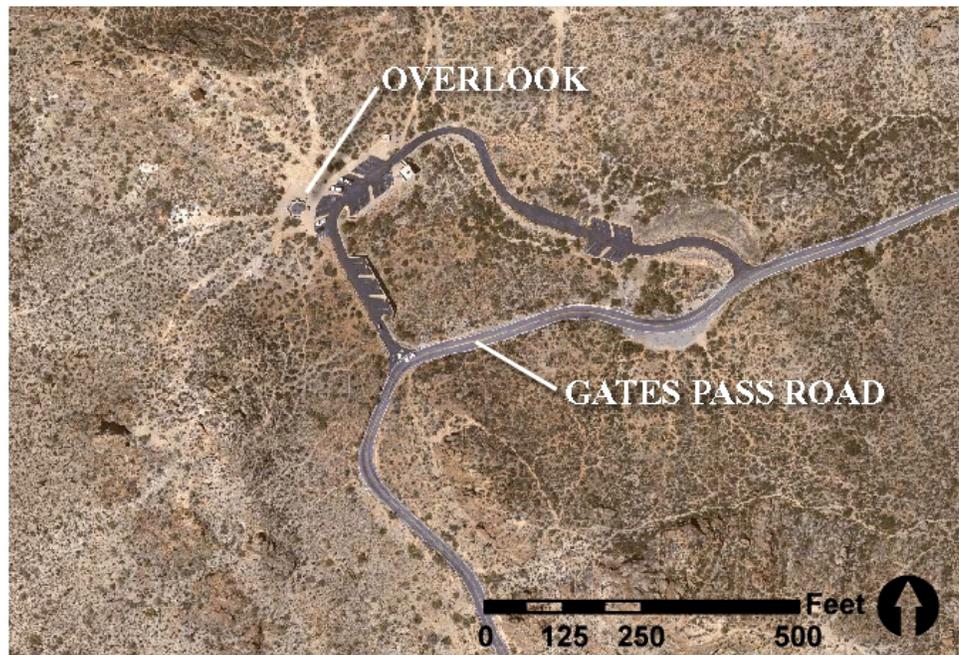


Figure 13-A: Aerial Photograph of Gates Pass Overlook

13. Public Use Facilities

An accessible trail that would allow the physically disabled to travel beyond the immediate overlook area was considered as part of the 1999 improvement project but not funded or constructed.

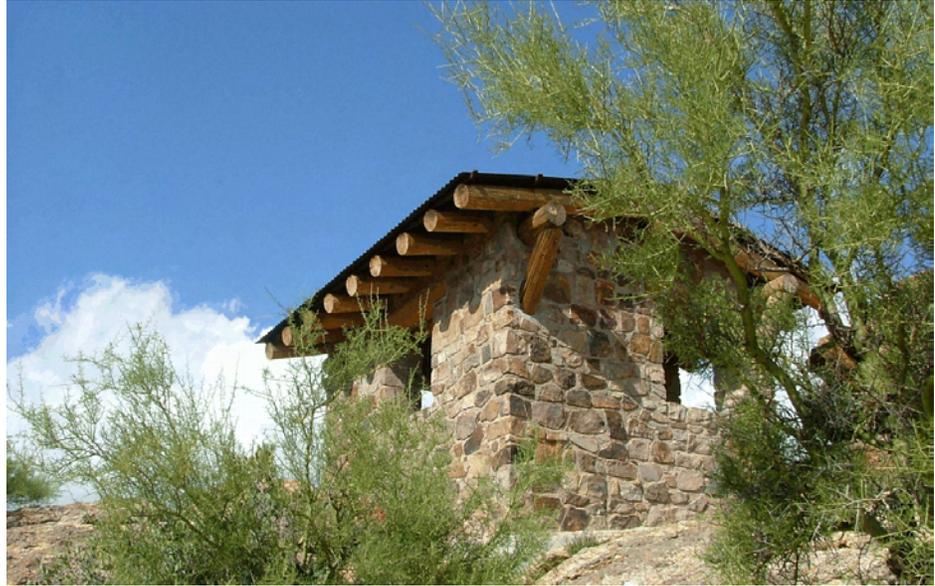


Figure 13-B: Photograph of Restored Lookout Building at Gates Pass Overlook



Figure 13-C: Photograph of Site Development at Gates Pass Overlook

Provided on the following page is an inventory and assessment of structures, site development, utility systems, and other features associated with the Gates Pass Overlook.

13. Public Use Facilities

Facility: Gates Pass Overlook

Description	Date Constructed / Renovated	Existing Condition	Potential Improvements
-------------	------------------------------	--------------------	------------------------

Access

Access Road	Gates Pass Road (via Speedway Blvd.)	1998	Fair	A new bicycle lane on the up-hill side of the road
Internal Roads	Gates Pass Overlook	1999	Good	As-needed repairs
Parking Lots	Entry Parking Lot: 12 spaces	1999	Good	As-needed repairs
	Main Lot: 20 spaces Exit Lot: 9 spaces	1999	Good	As-needed repairs
Fencing & Gates	(2) 12-foot entry swing gates	1995	Good	As-needed repairs
	(2) 20-foot exit swing gates	1995	Good	As-needed repairs

Utility Systems

Water System	None			
Sanitary System	Vault Restroom	1999	Excellent	As-needed repairs
Electrical Service	None			
Telephone Service	None			

Buildings

Building No. 1	Restroom, 400 SF, rock masonry construction	1999	Excellent	As-needed repairs
Building No. 2	Mountain Top Ramada, 143 SF rock masonry construction	Renovated 1999	Excellent	As-needed repairs
Building No. 3	Vista Ramada, 256 SF, steel construction	Renovated 1999	Excellent	As-needed repairs
Building No.4	CCC Restroom Structure, formerly vault toilet, rock masonry construction	Renovated 1999	Excellent	As-needed repairs

Signs

Identification Signs	Small identification sign at entry		Fair	Replacement with new TMP standard identification sign
Regulatory Signs	Park rules and regulations sign near overlook		Fair	Replacement with new TMP standard rules and regulations sign

13. Public Use Facilities

13.3 Juan Santa Cruz Picnic Area:

The Juan Santa Cruz Picnic Area is located west of Kinney Road and south of the Arizona-Sonora Desert Museum. (See Figure 13-R). It is also close to the Kings Canyon Trialhead. It is a popular picnic area for visitors to the Museum, for hikers using the Kings Canyon Trail, and for other park visitors.

Facilities at the Juan Santa Cruz Picnic Area include a paved road with pull-outs, picnic tables, ramadas, and a restroom building. The ramada structures are constructed of native stone masonry. They were built in the 1960's in a style that was similar to the CCC structures of the 1930's. The restroom building is a contemporary, prefabricated concrete structure.

The Arizona-Sonora Desert Museum has proposed an expansion that would extend the museum grounds into the area currently occupied by the picnic area. As of the date of this report, Pima County is reviewing this proposal.

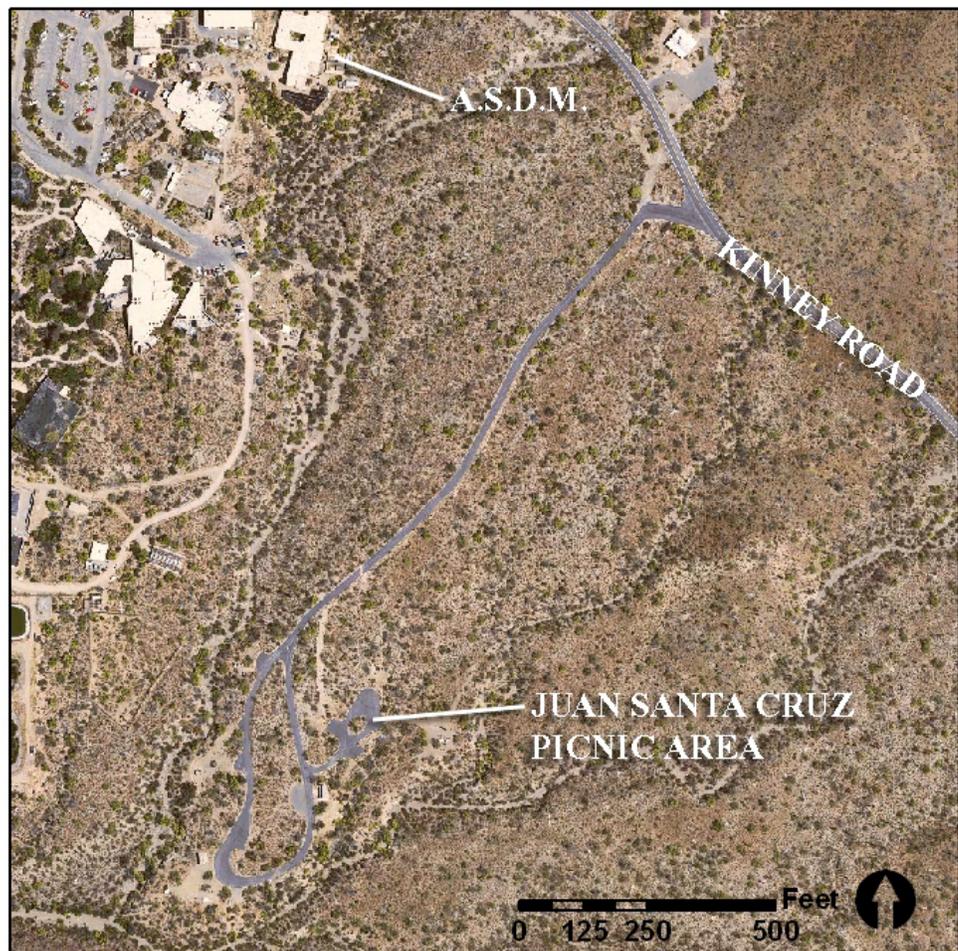


Figure 13-D: Aerial Photograph of Juan Santa Cruz Picnic Area

13. Public Use Facilities



Figure 13-E: Photo of Ramada Structure at Juan Santa Cruz Picnic Area

Provided on the following page is an inventory and assessment of the facilities at the Juan Santa Cruz Picnic Area.

13. Public Use Facilities

Facility: Juan Santa Cruz Picnic Area

	Date Constructed / Renovated	Existing Condition	Potential Improvements	
Access				
Access Road	Kinney Road	1987	Good	
Internal Roads	(Unnamed Campground Road)	1987	Good	Seal cracks and slurry seal
Buildings				
Restroom	292 SF pre-cast concrete restroom. Vandal proof stainless steel fixtures	2005	Excellent	As-needed repairs
Ramada #1	Older vandalized unit, currently has no roof, BBQ unit destroyed	1960's	Poor	Preserve rockwork, replace BBQ and roof. Mitigate view of ASDM fence at wolf enclosure.
Ramada #2	70 SF ramada that has no roof or concrete floor	1960's	Poor	Preserve rockwork, replace roof, install a concrete floor
Ramada #3	270 SF ramada. Fenced to prevent entry. Concrete table w/ a saguaro rib roof. Rodent damage at pillars. Built-in fireplace.	1960's	Poor	Preserve rockwork, replace roof, remove rodent dens. Close fireplace to prevent unsafe use.
Utilities				
Potable Water	Potable water from main in Kinney Road			
Sanitary Sewer	Septic System			
Group Picnic Sites				
Picnic Table #1	8' long x 3'6" wide, Seating on three sides, BBQ and water	1960's	Fair	Evaluate to determine if facility should be repaired or replaced
Picnic Table #2	12' long x 4' wide, seating on 4 sides.	1960's	Fair	Evaluate to determine if facility should be repaired or replaced
Picnic Table #3	8' long x 42" wide. Seating on 3 sides with a rock back	1960's	Fair	Evaluate to determine if facility should be repaired or replaced
Picnic Table #4	7' long x 3' wide. Seating on both sides. Rock BBQ	1960's	Fair	Evaluate to determine if facility should be repaired or replaced
Picnic Table #5	7' long x 3' wide. Seating both sides. Rock BBQ.	1960's	Fair	Evaluate to determine if facility should be repaired or replaced
Picnic Table #6	7' long x 3' wide. Seating both sides. Free standing BBQ. The site has water.	1960's	Fair	Evaluate to determine if facility should be repaired or replaced
Signs				
Identification Sign	Small identification sign	2005	Good	Replacement with new TMP standard park identification sign
Regulatory Signs	Park rules and regulations sign		Good	Replacement with new TMP standard park identification sign

13. Public Use Facilities

13.4 Brown Mountain Picnic Area:

The Brown Mountain Picnic area is located west of Kinney Road and north of the Kinney Road / McCain Loop Road intersection. Facilities at this location include a paved road, pull-outs for picnic sites, ramadas, and picnic tables. There are no restrooms at this picnic area.

The Brown Mountain site is used as a parking and staging area for some hikers and bicyclists in addition to being used as a picnic area.

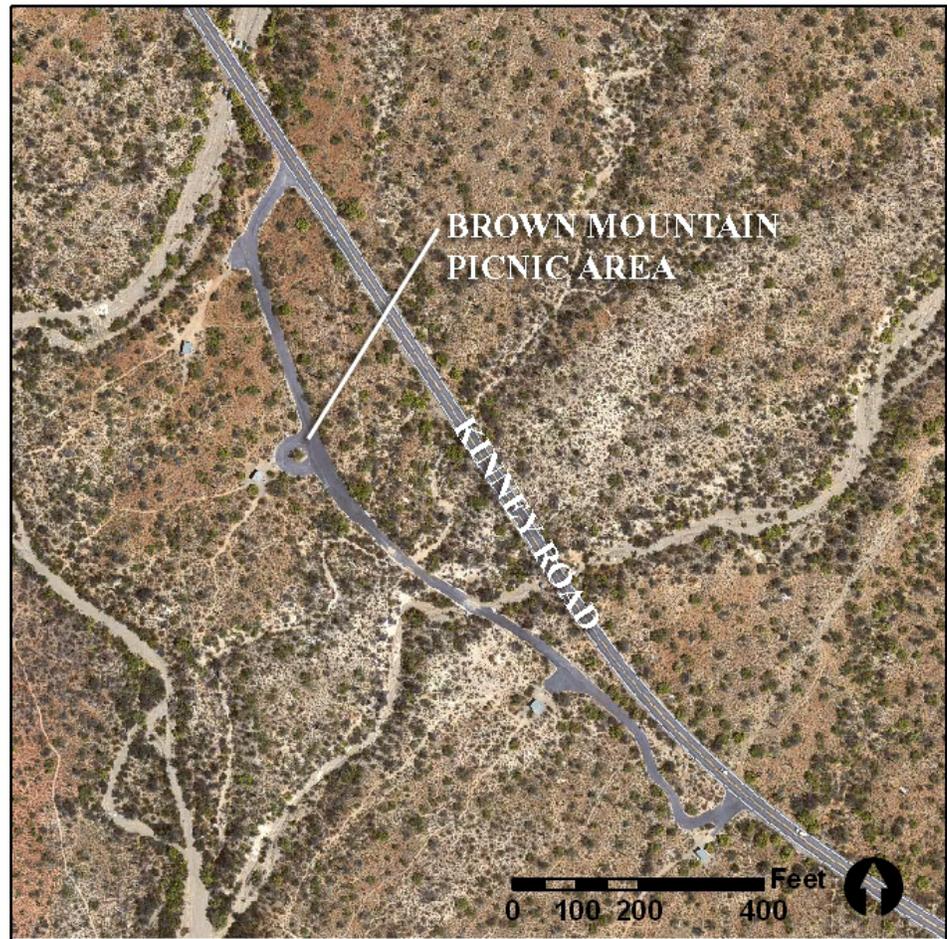


Figure 13-F: Aerial Photograph - Brown Mountain Picnic Area

13. Public Use Facilities



Figure 13-G: Photograph of Ramada at Brown Mountain Picnic Area

Provided on the following page is an inventory and assessment of the facilities and site improvements at the Brown Mountain Picnic Area.

13. Public Use Facilities

Facility: Brown Mountain Picnic Area

Description	Date Constructed / Renovated	Existing Condition	Potential Improvements
-------------	------------------------------	--------------------	------------------------

Access

Access Road	Kinney Road	1987	Good
Internal Roads	(Unnamed Picnic Area Drive)	1987	Good

Buildings

Ramada #1	192 SF single unit with one concrete picnic table and BBQ.	YCC 1976	Good
Ramada #2	252 SF family unit with two concrete picnic tables and BBQ	YCC 1976	Good
	192 SF single unit with one concrete picnic table and BBQ	YCC 1976	Good
	192 SF. single unit with one concrete picnic table and BBQ	YCC 1976	Good

Signs

Identification Signs	Small identification sign at entry	1995	Good
Regulatory Signs	Park rules and regulations sign	1995	Good
Interpretive Signs	None		Addition of an interpretive sign near Ramada #4 explaining the YCC program and the history of CB Brown

13. Public Use Facilities

13.5 Ironwood Picnic Area:

The Ironwood Picnic area is located west of Kinney Road between the intersection of Kinney Road and Gates Pass Road and the park's south boundary. (See Figure 13-R). It serves picnickers and also functions as a staging area for hikers and bicyclists using nearby portions of the park.

Facilities at the Ironwood Picnic Area include a paved road, pull-outs at picnic sites, ramadas, picnic tables, and a restroom. The ramadas are constructed with native stone in a style similar to the CCC structures of the 1930's. The restroom is a contemporary, precast concrete structure.

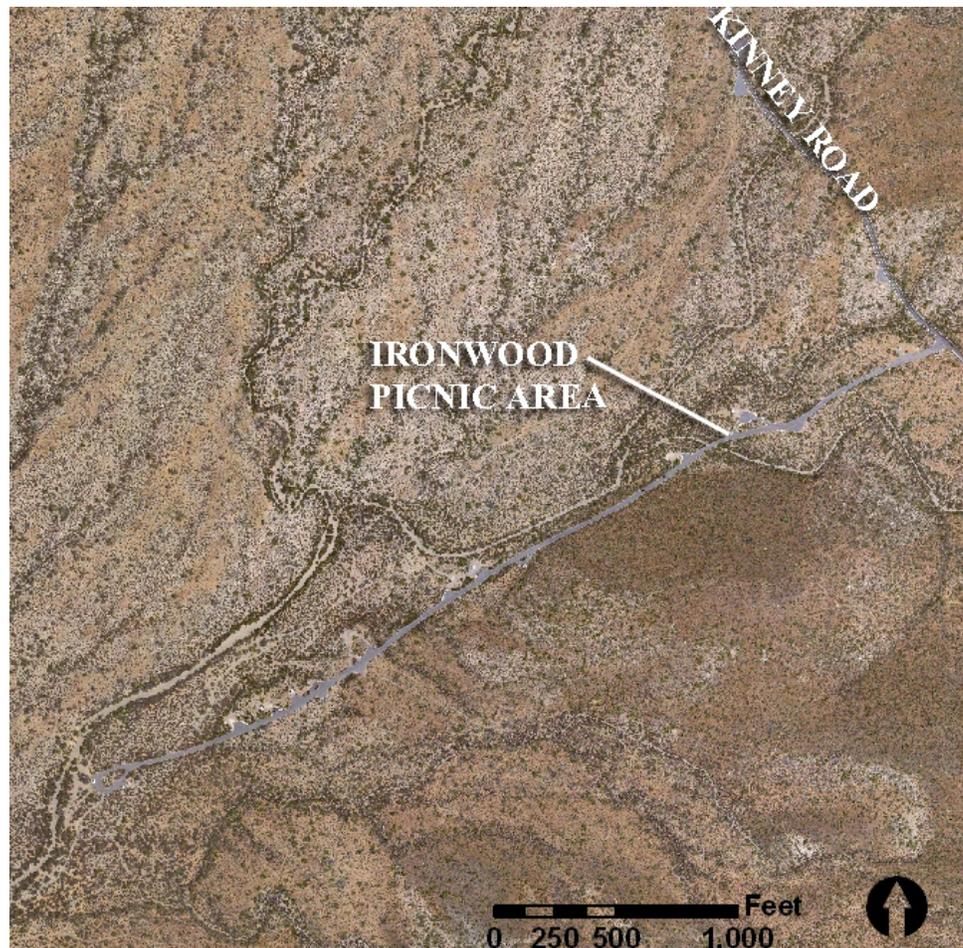


Figure 13-H: Aerial Photograph of Ironwood Picnic Area

13. Public Use Facilities



Figure 13-I: Photograph of Ironwood Picnic Area Drive

Provided on the following page is an inventory and assessment of the facilities and site improvements at the Ironwood Picnic Area.

13. Public Use Facilities

Facility: Ironwood Picnic Area

Description	Date Constructed / Renovated	Existing Condition	Potential Improvements
-------------	------------------------------	--------------------	------------------------

Access

Access Road	Kinney Road			
Internal Roads	Hal Gras Road	2005	Good	Sealing cracks and slurry seal
Parking Lots	None			
Fencing and Gates	(2) 12-foot swing gates at entry	1982	Good	

Buildings

Ramada #1	153 sq. ft. single family	YCC 1978	Good	Add concrete floor
Ramada #2	153 sq. ft. single family	YCC 1978	Good	Add concrete floor
Ramada #3	153 sq. ft. single family	YCC 1978	Good	Add concrete floor
Ramada #4	153 sq. ft. single family	YCC 1978	Good	Add concrete floor
Restroom #1	60 sq. ft. uni-sex pre-cast concrete with vault containment	1999	Very Good	
Restroom #2	60 sq. ft. uni-sex pre-cast concrete with vault containment	1999	Very Good	

Other Structures

Roadside Table #1	Concrete table is missing	1978	Poor	Replace table
Roadside Table #2	Single family, concrete	1978	Fair	
Roadside Table #3	Concrete, vandalized	1978	Poor	Replace table
Roadside Table #4	Concrete, vandalized	1978	Poor	Replace table
Roadside Table #5	Single family, concrete	1978	Fair	
Roadside Table #6	Group table under Ironwood	1965	Fair	
Roadside Table #7	Single family, concrete	1978	Fair	

Signs

Identification Signs	Small identification sign at entry			Replacement with new TMP standard identifications sign. Recommend new ID signs at each table / ramada
Regulatory Signs	Regulatory signs located at entry	1995	Good	Replacement with new TMP standard rules and regulations sign

13. Public Use Facilities

13.6 Archery Range:

The Archery Range is located east of Kinney Road, approximately 1.5 miles north of the Kinney Road / Gates Pass Road Intersection. (See Figure 13-R). Facilities at the range include an unpaved entry drive, an unpaved parking area, a large ramada, and a restroom building. Potable water has been extended to the site.

The facility consists of a practice range with targets at distances of 20 to 70 yards. There are also three (3) target roving or trail courses. A fee of \$3.00 per shooter per day is charged for use of the facility. The range is open daily from 7:00 AM to dusk. It is not staffed and fees are collected at an "Honest John" box.

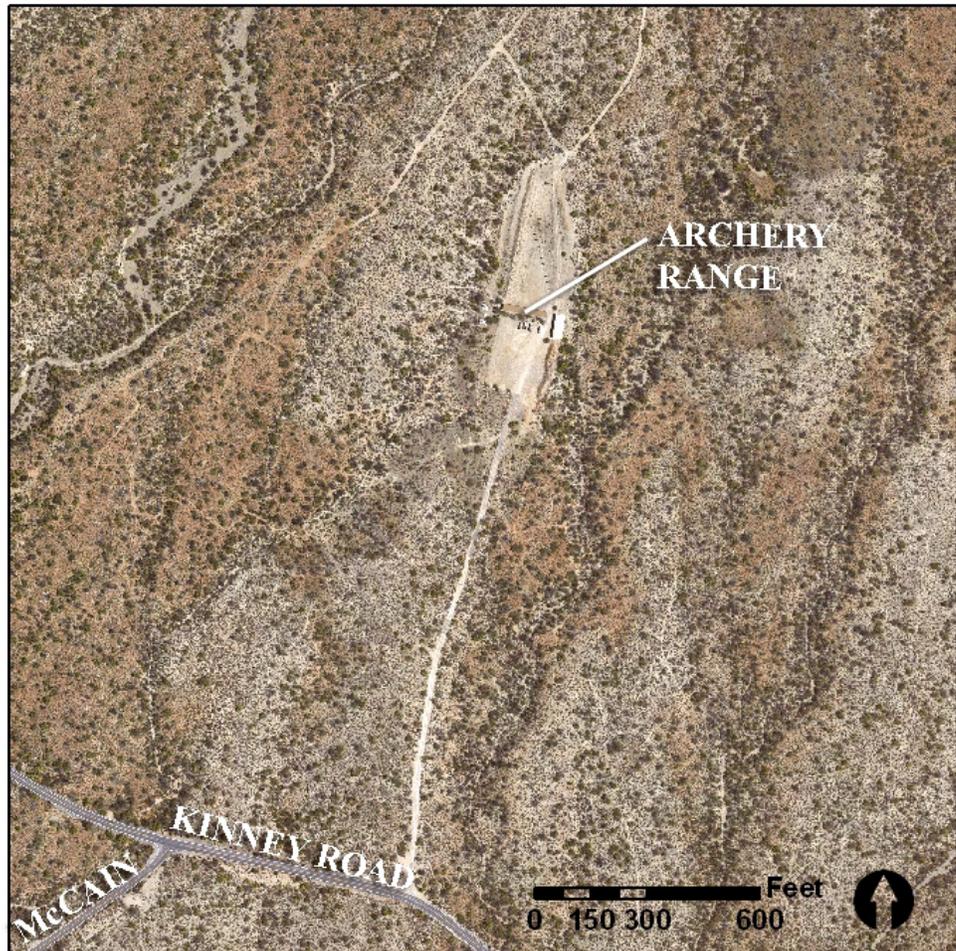


Figure 13-J: Aerial Photograph of Archery Range

13. Public Use Facilities



Figure 13-K: Photograph of Archery Range

Provided in the following page is an inventory and assessment of facilities and improvements at the Tucson Mountain Park Archery Range.

13. Public Use Facilities

Facility: Archery Range

Description	Date Constructed / Renovated	Existing Condition	Potential Improvements
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Access

Access Road	Kinney Road	2003	Good	
Internal Road	Dirt entry road from Kinney Road to archery range, approx. 1,400'	Routinely graded	Fair	Paving of entry road
Parking Lots	Dirt parking lot at archery range	Routinely graded	Fair	Paving of parking lot
Fencing and Gates				

Utility Systems

Water System	Potable water from main in Kinney Road		Fair	
Sanitary Sewer	Septic System		Good	
Electrical Service	None			
Telephone Service	None			

Buildings

Restroom / Storage	1,364 masonry building with rock veneer. Includes restrooms and storage area	1981 by YACC crews	Fair	Repair to exterior (rock veneer) and general repair work
Shooting Ramada	2,000 SF ramada. Rock veneered steel casing columns.		Good	Routine maintenance of roof, etc.
Ramada 1	192 SF Ramada with barbecue		Poor	Replacement of ramada roof and general repair work.
Ramada 2	192 SF Ramada with barbecue		Poor	Replacement of ramada roof and general repair work.

Signs

Identification Sign	Small identification sign at entry from Kinney Road		Good	Replacement with new TMP standard identification sign
Regulatory Signs	Rules and regulations sign on restroom		Fair	Replacement with new TMP standard park rules and regulations sign

13. Public Use Facilities

13.7 Rifle and Pistol Range:

The Rifle and Pistol Range is located east of Kinney Road, approximately 1.5 miles south of the Kinney Road / Gates Pass Road Intersection. (See Figure 13-R). The range was opened in 1955 and expanded in 1972. Facilities at the range include an unpaved entry drive, an unpaved parking area, a large ramada, and a small office building. There is a vault toilet without water at the site. There are no utility services at the facility.

The range is a bermed facility with shooting distances between 5 and 100 yards. A safety fan, 300 yards beyond the containment berm has been established, fenced, and signed in accordance with the National Rifle Association's Standards Manual. Noise emanating from the range is periodically monitored. Noise levels are below the threshold decibel level for facilities of this type as established by State of Arizona statutes.

The range is designed for pistols and rifles, only. There are no facilities for skeet or trap shooting at the Tucson Mountain Park range.

The range is supervised by Pima County Natural Resource, Parks, and Recreation Department staff and all shooters must register before using the facility and must abide by range safety and gun handling regulations. The range is open three-days per week (Friday, Saturday, and Sunday) from 8:00 AM to 5:00 PM. The daily fee is \$4.00 per shooter.

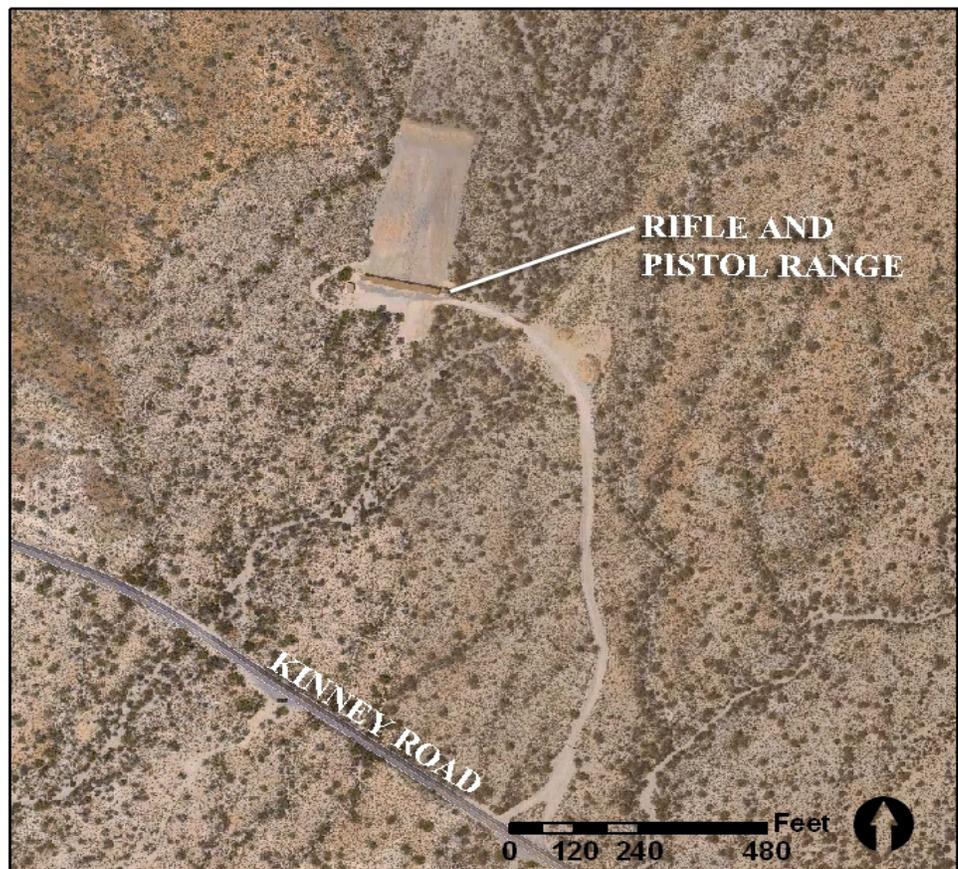


Figure 13-L: Aerial Photograph - Rifle and Pistol Range

13. Public Use Facilities

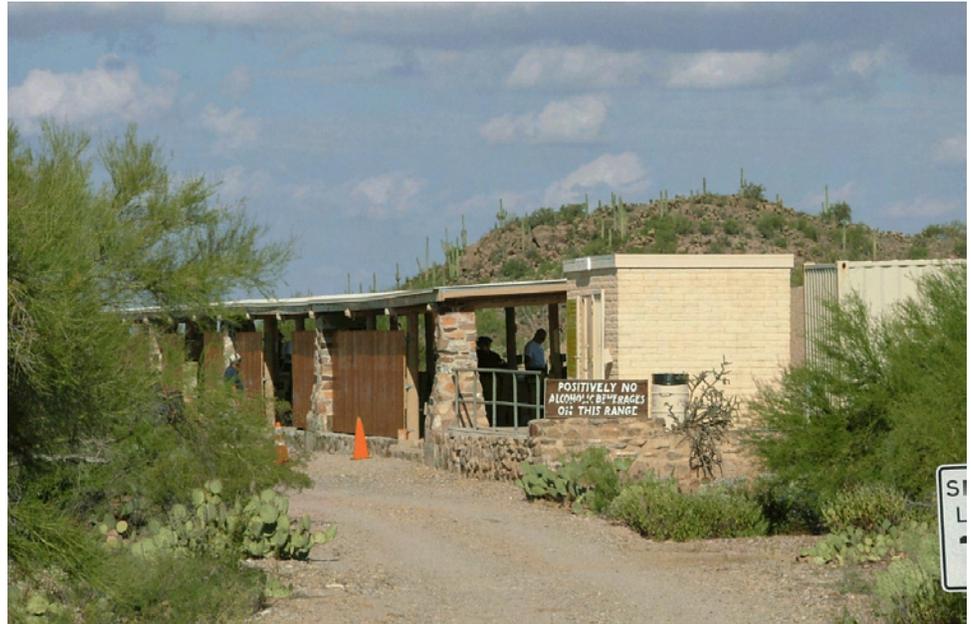


Figure 13-M: Photograph - Rifle and Pistol Range



Figure 13-N: Photograph - Rifle and Pistol Range

Provided on the following page is an inventory and assessment of the facilities and improvements at the Tucson Mountain Park Rifle and Pistol Range.

13. Public Use Facilities

Facility: Rifle and Pistol Range

Description	Date Constructed / Renovated	Existing Condition	Potential Improvements
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Access

Access Road	Kinney Road	2003	Good	
Internal Roads	Dirt entry road from Kinney Road to the shooting range, approx. 500'	Routinely graded	Fair	Paving of entry road
Parking Lots	Dirt parking lot at the shooting facility	Routinely graded	Fair	Paving of parking lot
Fencing and Gates	18' double swing entry gate. Shooting facility is fenced with 4-strand barbed wire fence with security signs	1980	Good	Paving of new fencing around perimeter of shooting range. Wildlife fencing should be considered.

Utility Systems

Water System	None			
Sanitary System	Vault System	1972	Fair	Replacement of system in conjunction w/ new restroom
Electrical Service	None			
Telephone Service				

Buildings

Restroom	220 SF masonry building, dual sex restroom	1972	Fair	Replacement w/ new restroom.
Office Building	88 SF masonry building, no windows, steel security door	1983	Good	
Shooting Ramada	2,400 SF shooting ramada	1983	Fair	As-needed repairs

Signs

Identification Signs	Small identification sign at entry	1983	Good	Replacement with new TMP standard identification sign
Regulatory Signs	Rules and regulations sign at range.	2005	Good	Replacement with new TMP standard rules and regulations sign
Other	Rock Sign "This Park is for all etc"	1976	Poor	Removal or replacement of sign

13. Public Use Facilities

13.8 Gilbert Ray Campground:

The Gilbert Ray Campground is located southwest of the intersection of Kinney Road and McCain Loop Road. Facilities at the campground include 130 RV sites with 30 amp electrical hook-ups, a limited number of tent sites, three educational ramadas, picnic ramadas, a campground host area with ramada, centrally located restroom buildings, a dump station, and dispersed potable water hydrants. There is also a registration building with a small public gathering room. There are no shower facilities at the site.

Utility services at the campground include potable water, electricity, and telephone. Waste-water is treated and disposed of at an on-site sewage lagoon.

The campground is open year-round but the registration building is staffed only during the cooler period, which typically extends from November to April. Camping fees are \$20.00 per night for sites with electrical hook-ups and \$10.00 per night for tent sites.

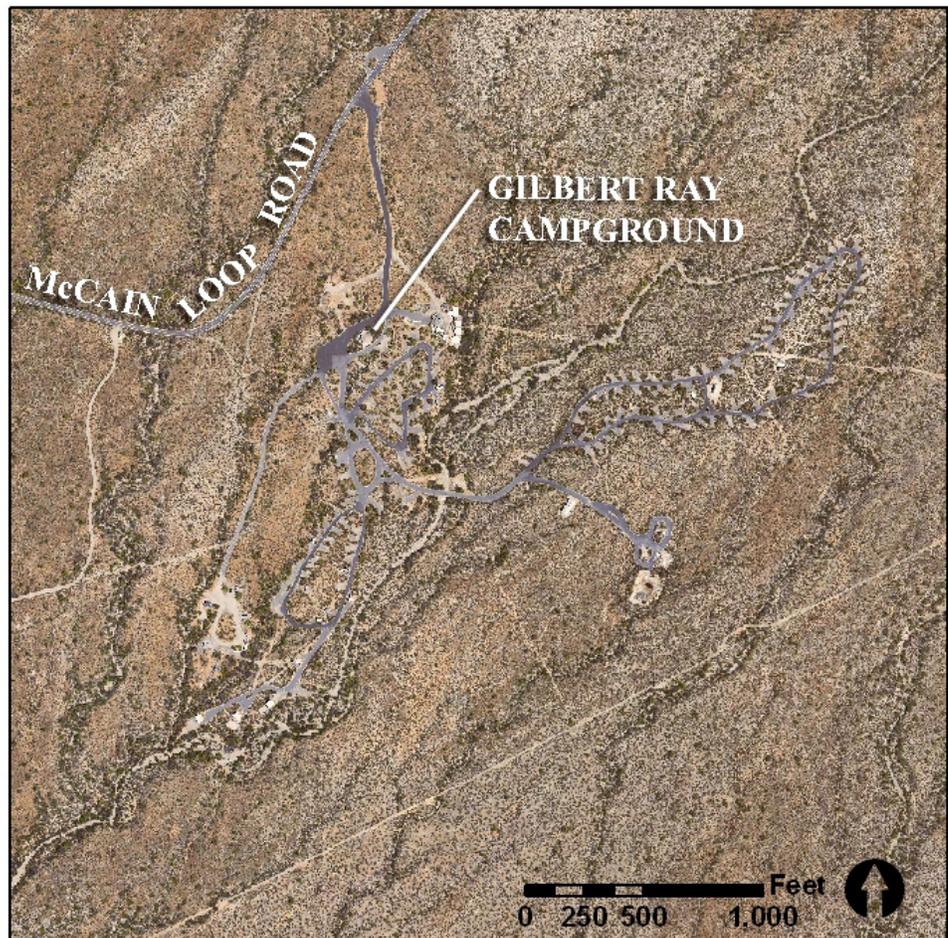


Figure 13-O: Aerial Photograph - Gilbert Ray Campground

13. Public Use Facilities



Figure 13-P: Photograph - Registration Building at Gilbert Ray Campground



Figure 13-Q: Photograph - Gilbert Ray Campground - Campsite / Ramada

Provided on the following page is an inventory and assessment of the facilities and improvements at the Gilbert Ray Campground.

13. Public Use Facilities

Facility: Gilbert Ray Campground

Description	Date Constructed / Renovated	Existing Condition	Potential Improvements
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Access

Access Roads

Kinney Road	1987	Good	
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McCain Loop Road	1979	Fair	New Overlay
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Internal Roads

Gilbert Ray Campground Rd	1987	Good	Seal cracks and slurry seal
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A-Loop Road	1987	Good	Seal cracks and slurry seal
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C-Loop Road	1987	Good	Seal cracks and slurry seal
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H-Loop Road	1987	Good	Seal cracks and slurry seal
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Dump Station Road	1987	Good	Seal cracks and slurry seal
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Utility Systems

Water System

Water distribution system to some but not all campsites. Galvanized steel pipe.		Fair	Replacement of potable water distribution system throughout campground with self-closing hydrants at all campsites.
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Sewage Treatment and Disposal

9000 SF earth lagoon	1963	Good	New powder coated chain link fencing with wooden slats to conceal site better
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Dump Station

(2) Concrete dump stations	1998	Good	As-needed repairs
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Electrical Service

Trico Overhead Line (Sections 17 & 18)	1960's	Fair	Replace overhead electric line to camp host area with underground service.
Trico Overhead Line (Sections 5, 6, & 8)		Good	

Telephone Service

Underground: Follows Kinney Road	1982	Good	
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Buildings

Camp Host Area

609 SF group ramada	1960's	Good, has electricity	Evaluate to determine if repair or replacement is preferred alternative
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352 SF group ramada	1960's	Good, has electricity	Evaluate to determine if repair or replacement is preferred alternative
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352 SF group ramada	1960's	Good, has electricity	Evaluate to determine if repair or replacement is preferred alternative
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440 SF group ramada	1960's	Fair, no electricity	Evaluate to determine if repair or replacement is preferred alternative
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396 SF group ramada	1960's	Good, no electricity	Evaluate to determine if repair or replacement is preferred alternative
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13. Public Use Facilities

Description	Date Constructed / Renovated	Existing Condition	Potential Improvements	
Buildings (Continued)				
Restroom Building (Public at Registration Area)	430 SF precast concrete, dual sex	1999	Very Good	
Registration Building	1200 SF Registration bldg.	1975	Fair	Replace building
CCC Generator Building	94 sf historic building	1932	Fair	Restore as interpretive site
	704 SF educational ramada #2	2000	Very Good, has electric	
	704 SF educational ramada #3	2002	Very Good, has electric	
C-Loop Restroom	430 SF pre-cast concrete restroom, dual sex	2002	Very Good	
A-Loop Restroom	430 sf pre-cast concrete restroom, dual sex	2002	Very Good	
Old Restroom	Old Restroom	1960's	Closed	Remove
Double-wide, manufactured residential building	Building is being stored on the road leading to dump station without foundation or utility hook-ups	2006	Poor	Have unit removed from campground
Campsites				
A-Loop	A-Loop Campsites	1997	Good	Upgrade electrical service to all campsites to 50 amp. Install individual hose bib at each camp site. Install a concrete pad for the picnic table at each camp site.
C-Loop	C-Loop Campsites	1997	Good	Upgrade electrical service to all campsites to 50 amp. Install individual hose bib at each camp site. Install a concrete pad for the picnic table at each camp site.
H-Loop	H-Loop Campsites	1995		
Tent Area	3 tent sites located between A & B Loops	2002	Fair	Current tent area is too close to road. Evaluate relocation
Waste Containment Sites				
Dumpster Enclosures	96 SF split face block enclosure	2002	Very Good	Add a new enclosure in C-Loop

14. Trails and Trailheads

14.1 Introduction:

The trail system within Tucson Mountain Park is a highly valued recreational resource. It is estimated that more than 150,000 hikers, walkers, trail runners, mountain bicyclists, and equestrians visit the park annually to use the park's trail system.

The system consists of a network of non-motorized, multi-use trails. Some of these trails were constructed by the Pima County Natural Resources, Parks, and Recreation Department. A significant portion of the trail system, however, was constructed by others without the approval of the Pima County Natural Resources, Parks, and Recreation Department. A map of the park's trail system prepared in the 1980's showed approximately 27 miles of trail. Field reconnaissance work performed in conjunction with this project found that in 2007 there are more than 100 miles of trail within the park.

The dramatic increase in the scope of the trail system is in part due to new trails constructed by the Department and the acquisition of new properties with existing trails. The majority of the increase, however, is due to the unauthorized construction of social trails.

In addition to trails, there are several trailheads, overlooks, pull-outs, and other access points that provide safe and legal access to the Tucson Mountain Park Trail System.



Figure 14-A: Photograph of Trail within Tucson Mountain Park

14. Trails and Trailheads

14.2 Trailheads:

There are multiple existing or planned formal trailheads that serve Tucson Mountain Park. The location of these trailheads is shown in Figure 14-P. Provided below is a brief description of the improvements and use patterns associated with each of these facilities.

Starr Pass Trailhead:

The Starr Pass Trailhead is located near the Starr Pass Resort in Section 18 (T16S-R13E). The trailhead was constructed in 2006 and includes a paved parking lot with 45 standard spaces, 2 handicapped spaces, and a turn-around area with adequate room for the maneuvering and parking of a truck / equestrian trailer rig.

Access to the trailhead is from Starr Pass Boulevard via Clearwater Road. Clearwater Road is currently unpaved. At the present time, there is inadequate signage along Starr Pass Boulevard to identify the route to the trailhead.



Figure 14-B: Aerial Photograph of Starr Pass Trailhead

14. Trails and Trailheads

The Starr Pass Trailhead is used primarily by hikers, trail runners, and mountain bicyclists. Very few equestrians were observed using this facility during the field reconnaissance phase of this project. A general profile of how users arrive at and use this facility is provided below. This profile was developed based on observational surveys conducted during the spring of 2007.

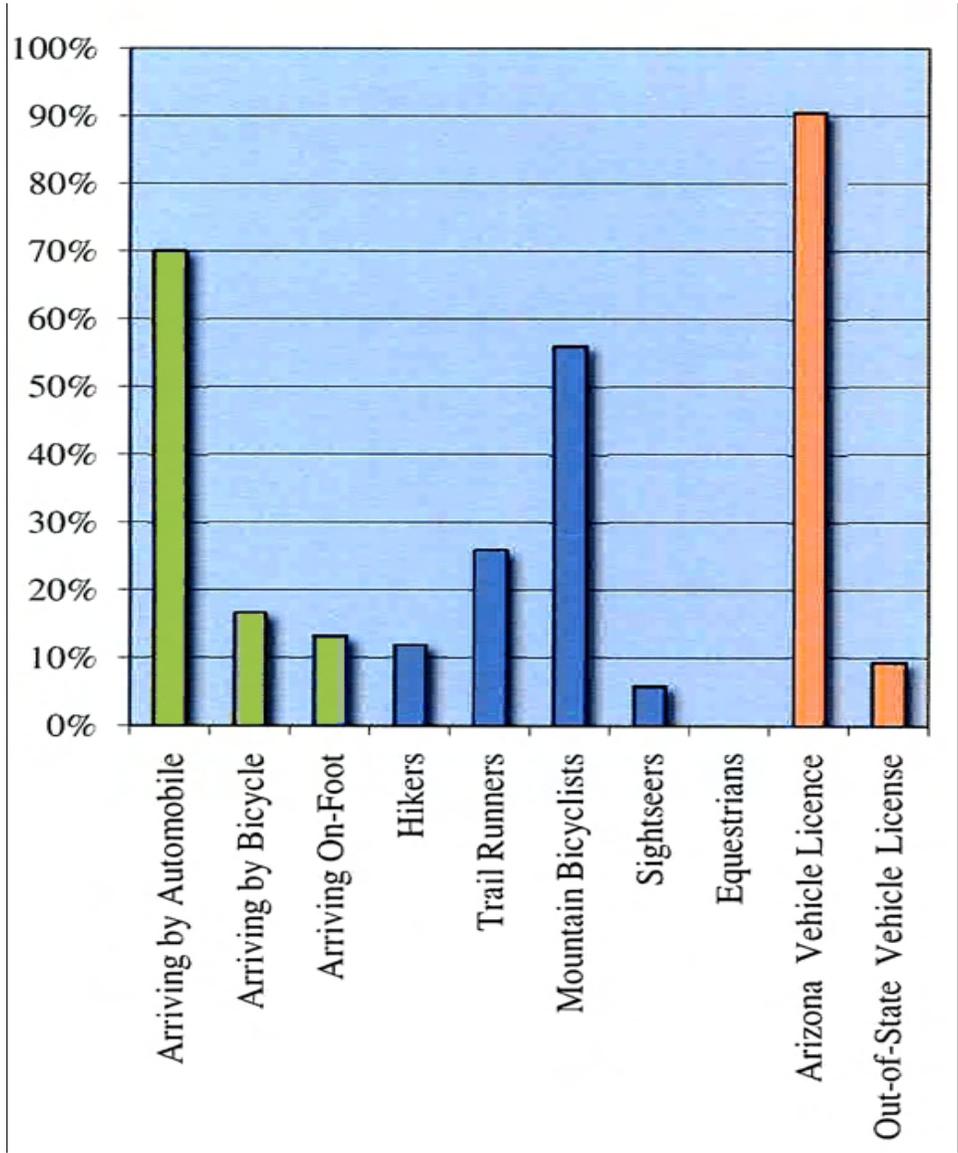


Figure 14-C: User Profile - Starr Pass Trailhead

14. Trails and Trailheads



Figure 14-D: Photograph of Starr Pass Trailhead

Camino de Oeste Trailhead:

The Camino de Oeste Trailhead is located at the south end of Camino de Oeste, approximately one mile south of Gates Pass Road, in Section 7 (T14S-R13E). The trailhead is currently unpaved and relatively small. It accommodates approximately six automobiles. There is insufficient room to maneuver and park a truck / equestrian trailer rig at this location. Various improvements are planned for this facility but they do not include any significant expansion of the parking area.

The Camino de Oeste Trailhead functions as a local facility serving local residents, many of whom walk to the site. It provides an opportunity for safe and legal access to Tucson Mountain Park for these residents and other member of the community.



Figure 14-E: Aerial Photograph of Camino de Oeste Trailhead

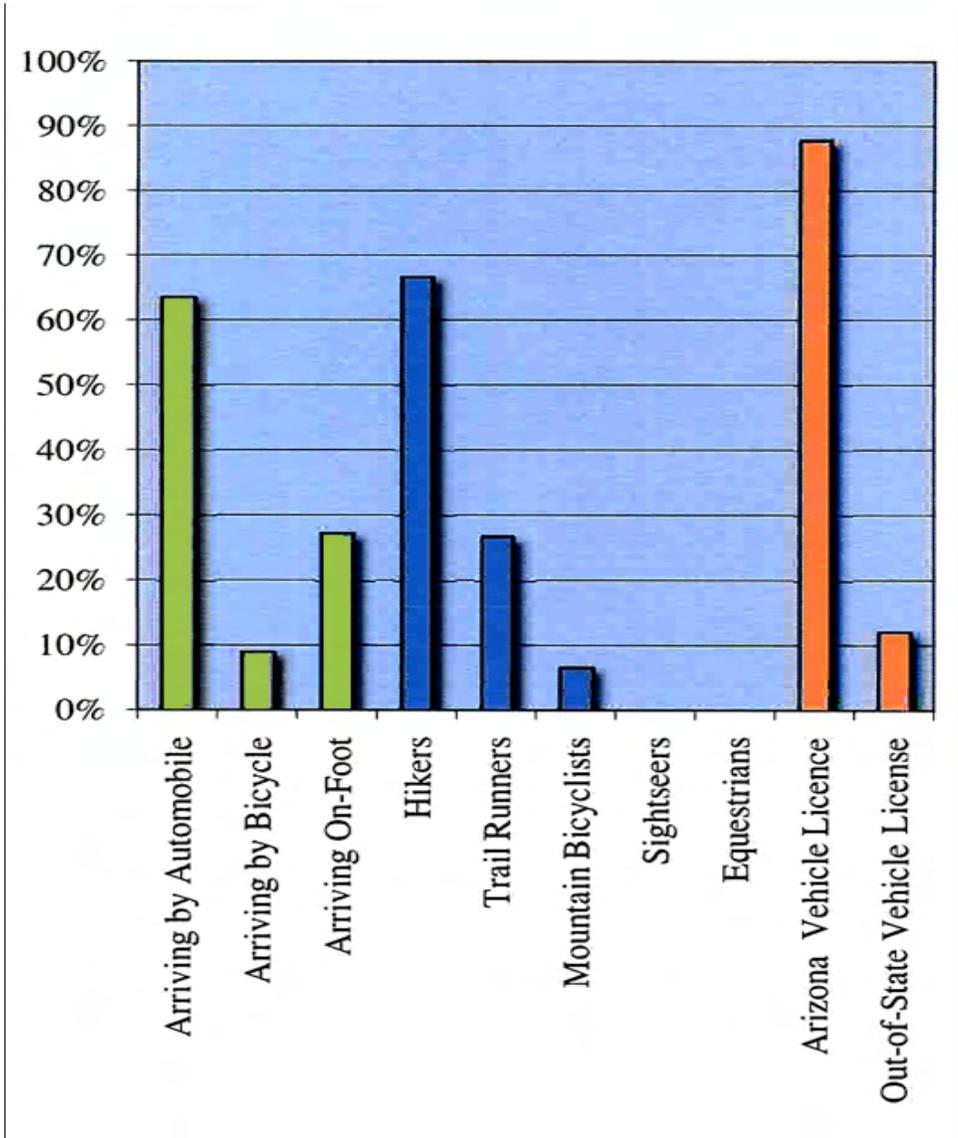


Figure 14-F: User Profile - Camino de Oeste Trailhead

14. Trails and Trailheads



Figure 14-G: Photograph of Camino de Oeste Trailhead

King Canyon Trailhead:

The King Canyon Trailhead is located east of Kinney Road near the Arizona-Sonora Desert Museum in Section 1 (T14S-R11E). (See Figure 14-P). The facility consists of an unpaved parking lot. The King Canyon Trailhead, while located in Tucson Mountain Park, functions primarily as a location where hikers access trails within Saguaro National Park. Because mountain bikes are prohibited on National Park trails accessed from this trailhead, nearly all users of this facility are hikers or trail-runners.

Sight visibility at the intersection of the trailhead and Kinney Road is poor. To address this issue, the Pima County Natural Resources, Parks and Recreation Department and Saguaro National Park have agreed to construct a new trailhead nearby and revegetate the existing trailhead site.



Figure 14-H: Aerial Photograph of Existing King Canyon Trailhead

14. Trails and Trailheads

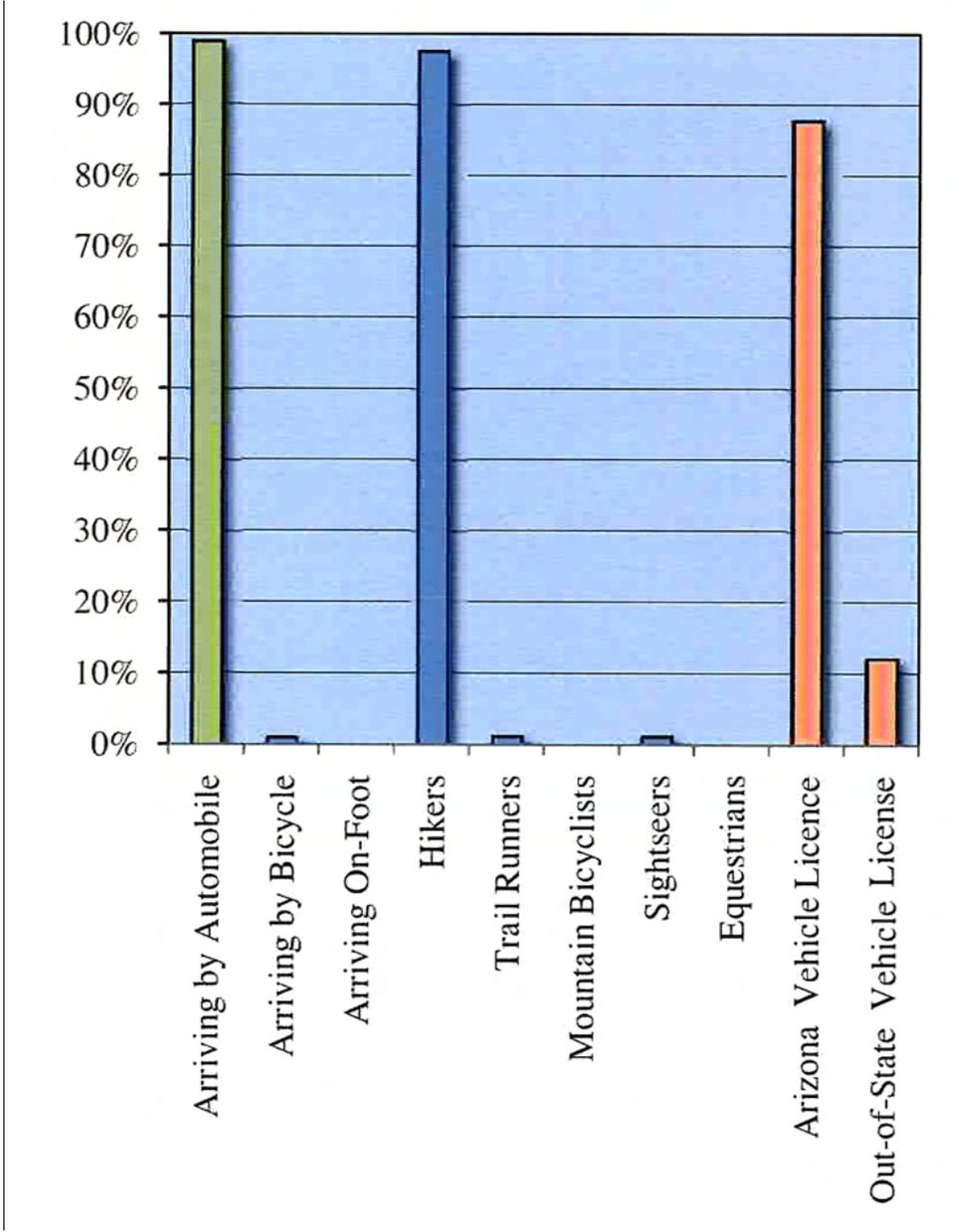


Figure 14-I: User Profile - King Canyon Trailhead



Figure 14-J: Photograph - King Canyon Trailhead

36th Street Trailhead:

The 36th Street Trailhead is located Sections 20 and 29 (T16S-R13E). The construction of the trailhead was completed in 2007 and includes a paved parking lot with 18 standard spaces and 2 handicapped spaces. The trailhead parking lot has a lockable gate at the entry lane, a tire-ripper pavement grate at the exit lane, and perimeter post-and-cable barrier. Access to the trailhead is from Mission Road or La Cholla Boulevard via 36th Street.

A count of vehicle traffic entering the trailhead parking lot conducted during the spring of 2007 showed a low volume of traffic entering this facility. Observational survey's showed a low volume of pedestrian and mountain bicycle use and yielded a sample that was too small to develop a profile of users.

It is anticipated that the use of the 36th Street trailhead will increase significantly when signs are installed directing traffic to this facility and when new trail maps are published informing the public of its presence.

14. Trails and Trailheads

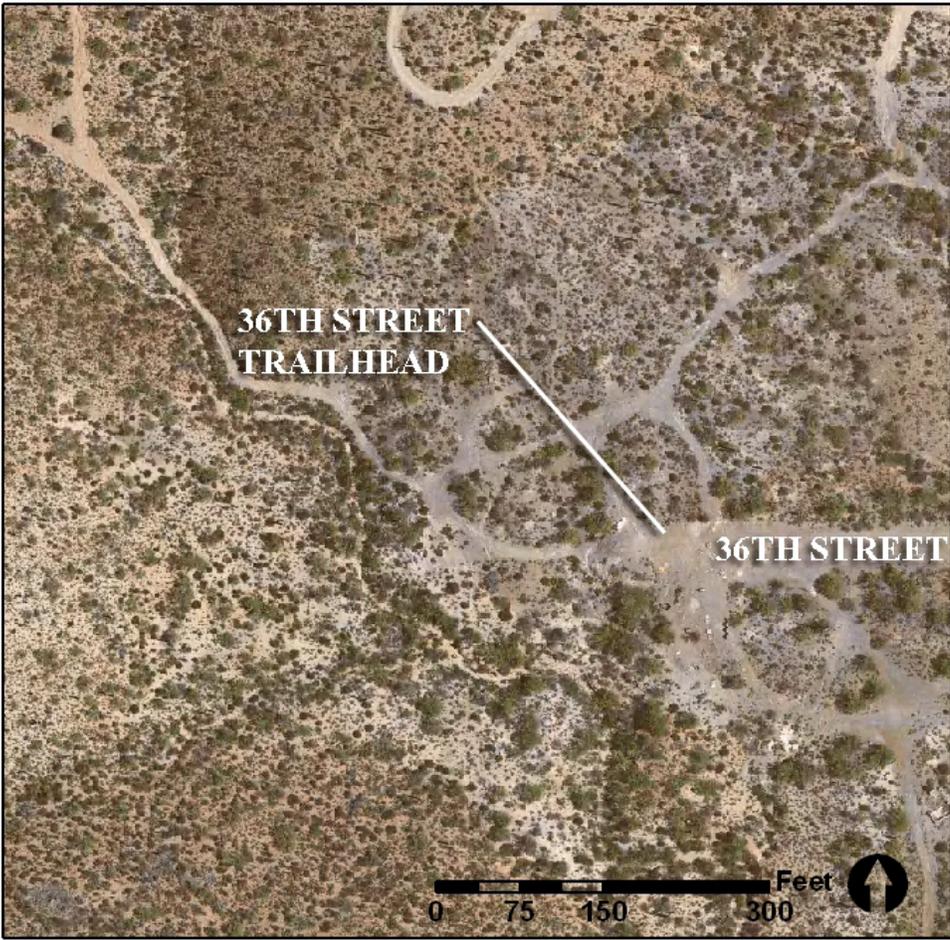


Figure 14-K: Aerial Photograph of 36th Street Trailhead (Pre-Construction)

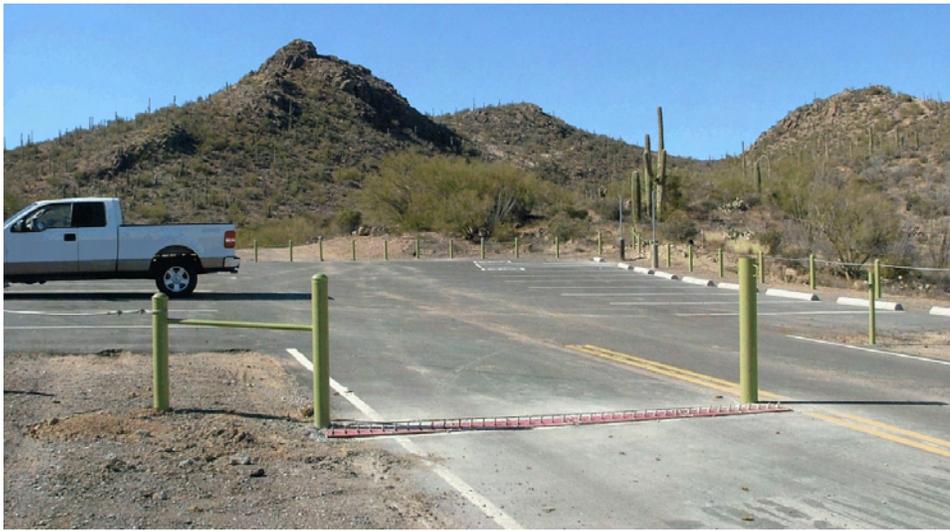


Figure 14-L: Photograph of 36th Street Trailhead

14. Trails and Trailheads

Mile Wide Trailhead:

The Mile Wide Trailhead is adjacent to the CAP Trail and is intended to provide access to that trail when it is developed and opened for public use. It is located in Section 3 (T14S-R11E). Its proximity to Tucson Mountain Park, however, makes it a potential point of access, although users would need to get to the park via the Mile Wide Road right-of-way. The Mile Wide Trailhead includes parking spaces for truck / equestrian trailer rigs and as such is noteworthy.



Figure 14-M: Aerial Photograph of Mile Wide Trailhead

Proposed Sarasota Trailhead:

The proposed Sarasota Trailhead is located in Section 25 (T14S-R12E) along the eastern edge of the Tucson Estates Subdivision. (See Figure 14-P). An existing development agreement between Pima County and the developer of the adjacent property calls for the developer to construct this facility. The proposed trailhead will support both hiking and equestrian use.

14. Trails and Trailheads

Proposed Explorer Trailhead:

The proposed Explorer Trailhead will be constructed at the southeast corner of the park, west of La Cholla Boulevard and west of the City of Tucson's Kennedy Park. The proposed site is in Section 28 (T14S-R13E). (See Figure 14-P). The planned facility will include a parking lot that will accommodate both automobiles and truck / equestrian trailer rigs.

Walk-in Trailhead at J.W. Marriott Starr Pass Resort:

It is possible to access Tucson Mountain Park from the J.W. Marriott Starr Pass Resort site in Section 18 (T14S-R13E). This walk-in entrance is used extensively by hotel guests and is also utilized by local residents. The hotel's visitor parking lot can be used for area residents who drive to this trailhead to gain access to the park.



Figure 14-N: Aerial Photograph - Walk-in Entry at Starr Pass Resort

Walk-in Trailhead(s) at Tucson Estates:

There are several locations along the common boundary between Tucson Mountain Park and the Tucson Estates subdivision where it is possible to walk into the park and access the park's trail system. Some of these entrances were constructed with the Department's knowledge and concurrence. Others have been constructed without authorization.



Figure 14-O: Photograph of Walk-in Entrance at Tucson Estates Subdivision

14.3 Roadside Pull-Outs

Along Kinney Road, Gates Pass Road, and McCain Loop Road there are 50 roadside pull-outs. (See Figure 14-Q). These pull-outs provide opportunities for motorists to safely pull-off the road at key vista points. Some of these pull-outs also function as trailheads.

Over-time, the system of roadside pull-outs has proved to be very successful. These pull-outs allow park visitors to safely stop, view, and take photographs of the many plants and landscape features that make the park so interesting. By providing these areas, automobiles are discouraged from driving off the road and damaging the native vegetation. They also enhance traffic safety by having traffic pull back onto the roads at locations where sight-visibility is adequate.

The roadside pull-outs are also used as trailheads. At nearly all of the pull-outs, there are short trails that extend a short distance into the park. These trails provide opportunities for visitors not equipped for long-distance hiking to view and experience the Sonoran Desert. At other trailheads, it is possible to access some of the principal trails within the park.

Provided below is a summary of the status of the conditions associated with each of the roadside pull-outs.

14. Trails and Trailheads

Facility: Gates Pass Road - Roadside Pullouts

	Description	Date Constructed / Renovated	Existing Condition	Potential Improvements
Roadside Pullouts				
G-1	First Pull-Out at east entry to Park	1985	Good	Improvements to entry sign and regulatory signs needed.
G-2	Second Pull-Out	1985	Fair	View restriction to east. Further evaluation needed.
G-3	Third Pull-Out. (Also referred to as Yetman Trailhead).	1985	Fair	Site has awkward parking due to layout. Recommend modifications to the lot.
G-4	Fourth Pull-Out	1985	Good	Sign damaged and requires replacement. Eliminate social trails, leave main trail.
G-5	Fifth Pull-Out	1985	Good	Trail markers needed. Eliminate social trails. Leave main trail to Gates Pass Trail.
G-6	Sixth Pull-Out	1985	Good	Trail markers needed. Eliminate social trails. Leave main trail to Gates Pass Trail.
G-7	Seventh Pull-Out	1985	Good	Trail markers needed. Eliminate all social trails. Leave main trail to Gates Pass Trail. Severe erosion next to pull-out
G-8	Eighth Pull-Out. Pull-out has trail that connects with Golden Gate Trail and one to Old Tucson	1985	Fair	Trail between this pull-out and Golden Gate Trail follows an old road. Trail requires some revegetation. Old Tucson uses this trail for equestrian rides. Confirm authorized use area and install gate at property line to properly identify boundary.
G-9	Ninth Pull-Out. Has trail that connects w/ Gates Pass Trail. Has extension that continues north on Gates Pass Trail following a road that connects w/ the road to SASI.	1985	Good	Missing a parking sign. Unauthorized memorial cross next to the trail.
G-10	Tenth Pull-Out. The pull-out also serves as an entry point to SASI	1985	Good	Trail markers needed at this location. Further evaluation of entry point needed.
G-11	Eleventh Pull-Out. Located east of Kinney Road / Gates Pass intersection, south side. The site is mail drop for Gilbert Ray Campground. No trail connections.	1985	Good	If site is to continue to be used as a mail drop site, mail box should be changed to a locking system.

14. Trails and Trailheads

Facility: Kinney Road - Roadside Pullouts

Roadside Pullouts

Description	Date Constructed / Renovated	Existing Condition	Potential Improvements
K-1	1985	Good	Improvements to entry sign and regulatory signs needed.
K-2	1985	Good	
K-3	1985	Good	
K-4	1985	Fair	Sight visibility problem. Prune vegetation to west improve sight distance.
K-5	1985		Replace missing identification sign.
K-6	1985		Replace missing identification sign.
K-7	1985	Good	
K-8	1985	Fair	Sight visibility problem.
K-9	1985	Good	Needs new identification sign for trail.
K-10	1985	Fair	Pavement repair. Seal cracks and slurry seal.
K-11	1985	Good	Needs new trail identification marker. Trail crossing sign on Kinney Road needed.
K-12	1985	Good	Needs new trail identification marker. Trail crossing sign on Kinney Road needed.
K-13	1985	Fair.	Sight visibility problem. Prune vegetation to improve sight distance.
K-14	1985	Good	Pavement repair. Seal cracks and slurry seal.
K-15			No longer exists
K-16	1985	Fair	Close to intersection. Sight visibility problem.
K-17	1985	Good	Pavement repair. Seal cracks and slurry seal.
K-18	1985	Good	Pavement repair. Seal cracks and slurry seal.
K-19	1985	Good	Pavement repair. Seal cracks and slurry seal.

14. Trails and Trailheads

K-20	Nineteenth Pull-Out	1985	Good	Pavement repair. Seal cracks and slurry seal.
K-21	Twentieth Pull-Out	1985	Good	Pavement repair. Seal cracks and slurry seal.
K-22	Twenty-first Pull-Out	1985	Good	Pavement repair. Seal cracks and slurry seal.
K-23	Twenty-second Pull-Out	1985	Good	Pavement repair. Seal cracks and slurry seal.
K-24	Twenty-third Pull-Out	1985	Good	Pavement repair. Seal cracks and slurry seal.
K-25	Twenty-fourth Pull-Out	1985	Good	Pavement repair. Seal cracks and slurry seal.
K-26	Twenty-fifth Pull-Out	1985	Good	Pavement repair. Seal cracks and slurry seal.
K-27	Twenty-sixth Pull-Out	Unknown	Poor	Unpaved.
K-28	Twenty-seventh Pull-Out	Unknown	Poor	Unpaved.
K-29	Twenty-eighth Pull-Out	Unknown	Poor	Unpaved. No post-and-cable or curb for access control.
K-30	Twenty-ninth Pull-Out	1985	Good	Pavement repair. Seal cracks and slurry seal.
K-31	Thirtieth Pull-Out	1985	Good	Pavement repair. Seal cracks and slurry seal.
K-32	Thirty-first Pull-Out	1985	Poor	Unpaved. Sight visibility problems. Should be evaluated for possible closure.

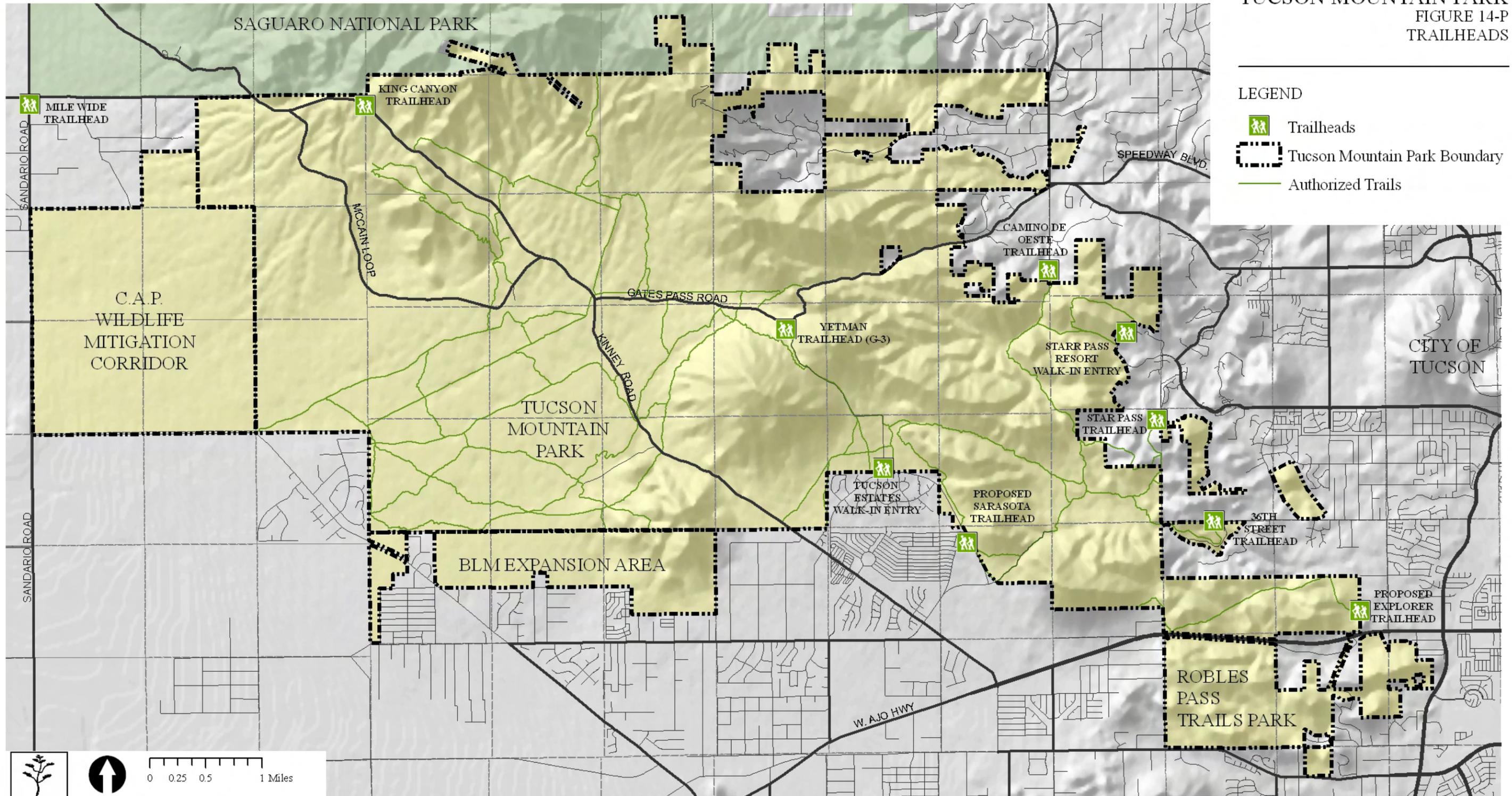
Facility: McCain Loop Road - Roadside Pullouts

Description	Date Constructed / Renovated	Existing Condition	Potential Improvements
-------------	------------------------------	--------------------	------------------------

Roadside Pullouts

M-1	First Pull-Out	Unknown	Poor	Pave. Replace post-and-cable barrier with curb.
M-2	Second Pull-Out	Unknown	Poor	Pave. Replace post-and-cable barrier with curb.
M-3	Third Pull-Out	Unknown	Poor	Pave. Replace post-and-cable barrier with curb.
M-4	Fourth Pull-Out	Unknown	Poor	Pave. Replace post-and-cable barrier with curb.
M-5	Fifth Pull-Out	Unknown	Poor	Pave. Replace post-and-cable barrier with curb.
M-6	Sixth Pull-Out	Unknown	Poor	Pave. Replace post-and-cable barrier with curb.
M-7	Seventh Pull-Out	Unknown	Poor	Pave. Replace post-and-cable barrier with curb.
M-8	Eighth Pull-Out	1985	Good	Pave. Replace post-and-cable barrier with curb.

TUCSON MOUNTAIN PARK
 FIGURE 14-P
 TRAILHEADS

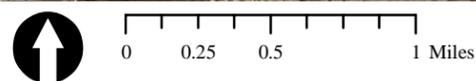
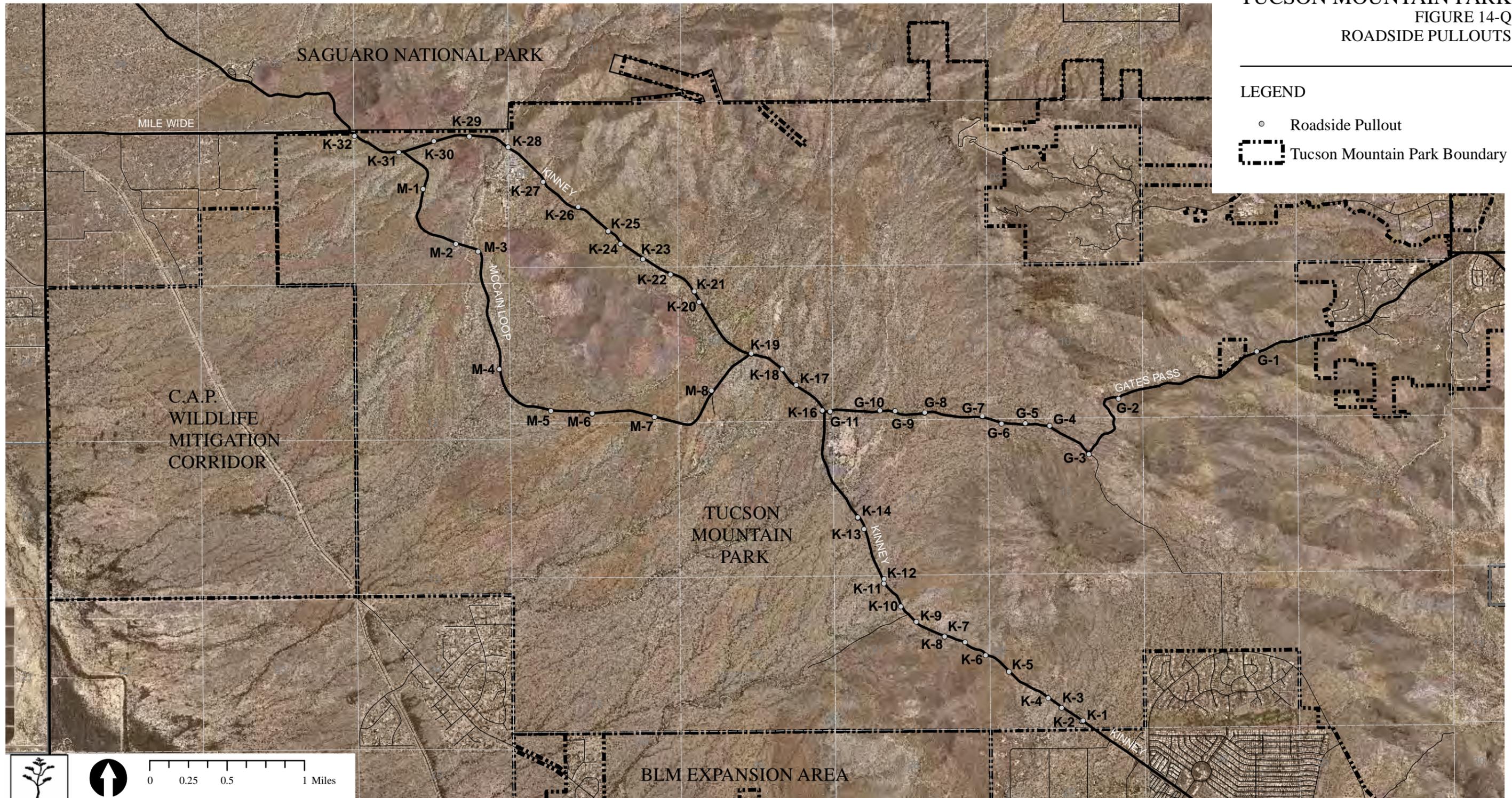


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TUCSON MOUNTAIN PARK
FIGURE 14-Q
ROADSIDE PULLOUTS

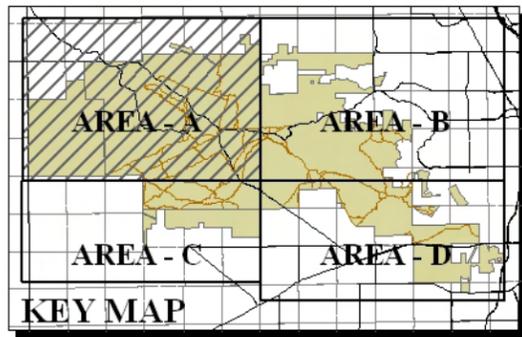
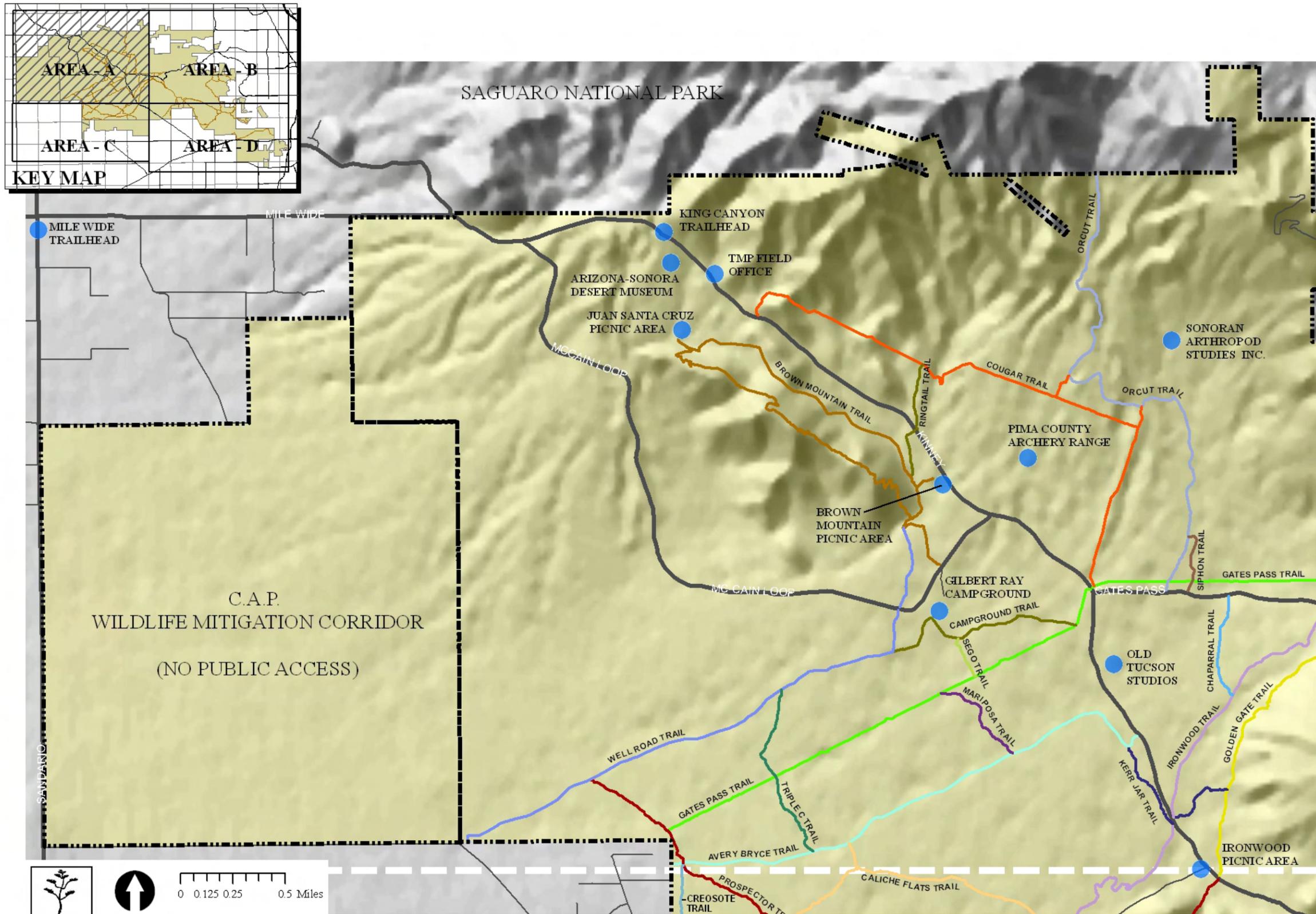
LEGEND

- Roadside Pullout
- ⬡ Tucson Mountain Park Boundary



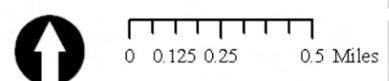
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TUCSON MOUNTAIN PARK
 FIGURE 14-R
 TRAILS MAP
 AREA - A



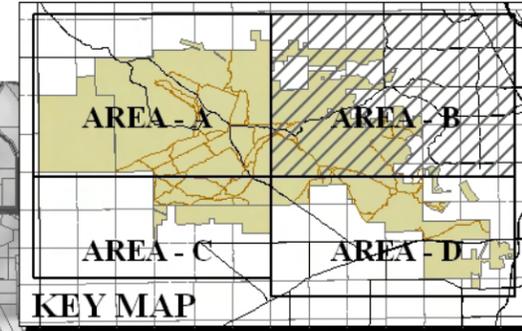
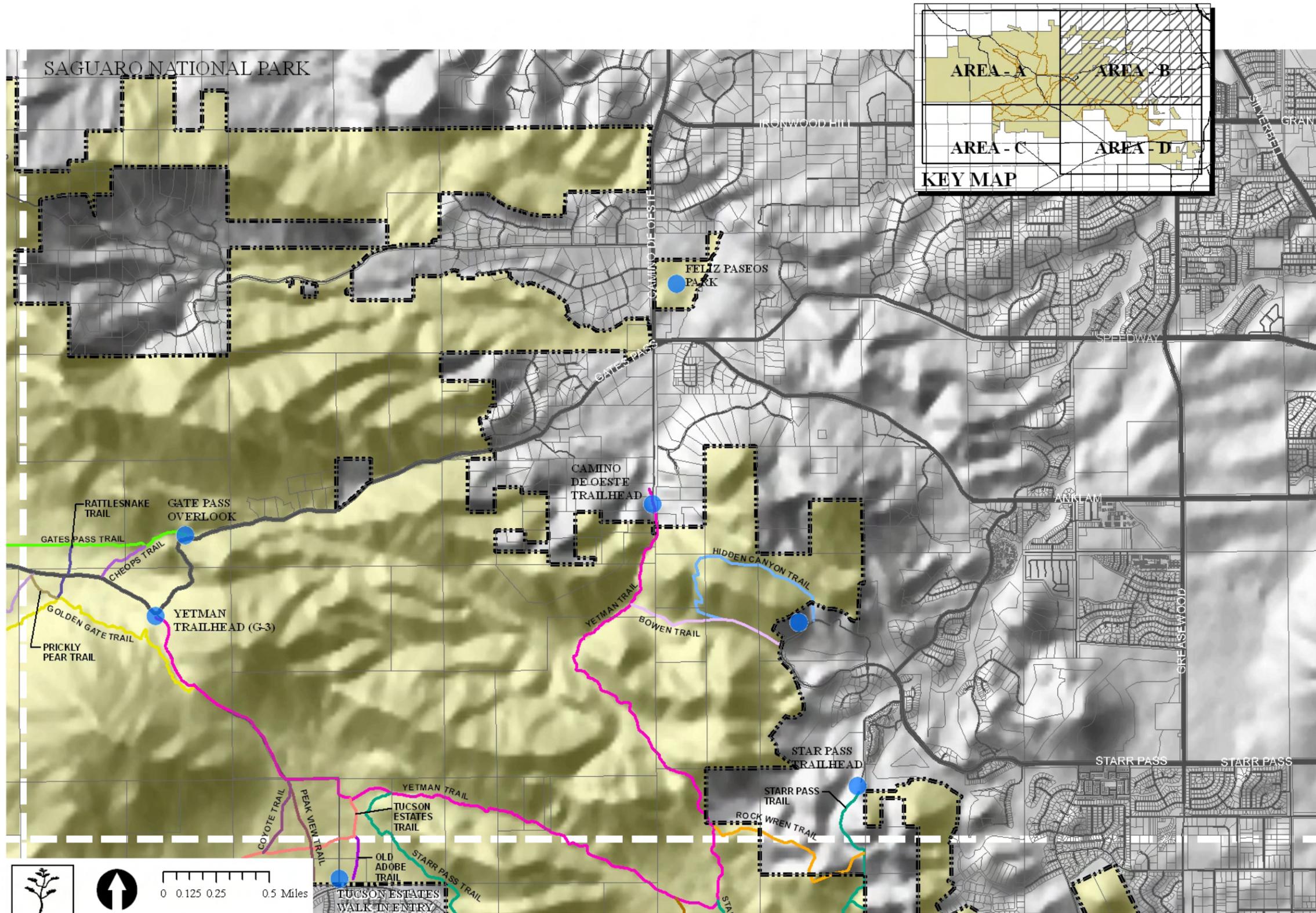
LEGEND

- 36TH STREET TRAIL
- AVERY BRYCE TRAIL
- BOWEN TRAIL
- BROWN MOUNTAIN TRAIL
- CALICHE FLATS TRAIL
- CAMPGROUND TRAIL
- CHAPARRAL TRAIL
- CHEOPS TRAIL
- COUGAR TRAIL
- COYOTE TRAIL
- CREOSOTE TRAIL
- EXPLORER TRAIL
- GATES PASS TRAIL
- GOLDEN GATE TRAIL
- HIDDEN CANYON TRAIL
- IRONWOOD TRAIL
- KERR JAR TRAIL
- MARIPOSA TRAIL
- OLD ADOBE TRAIL
- ORCUT TRAIL
- PALO VERDE TRAIL
- PEAK VIEW TRAIL
- PRICKLEY PEAR TRAIL
- PROSPECTOR TRAIL
- RATTLESNAKE TRAIL
- RINGTAIL TRAIL
- ROCK WREN TRAIL
- SAGUARO RIB TRAIL
- SEGO TRAIL
- SILVER ORE TRAIL
- SIPHON TRAIL
- STARR PASS TRAIL
- TRIPLE C TRAIL
- TUCSON ESTATES TRAIL
- WELL ROAD TRAIL
- YETMAN TRAIL
- ROBLES TRAIL - PLANNED
- POINTS OF INTEREST
- TMP BOUNDARY



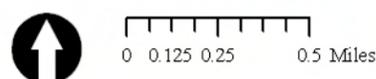
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TUCSON MOUNTAIN PARK
 FIGURE 14-S
 TRAILS MAP
 AREA - B



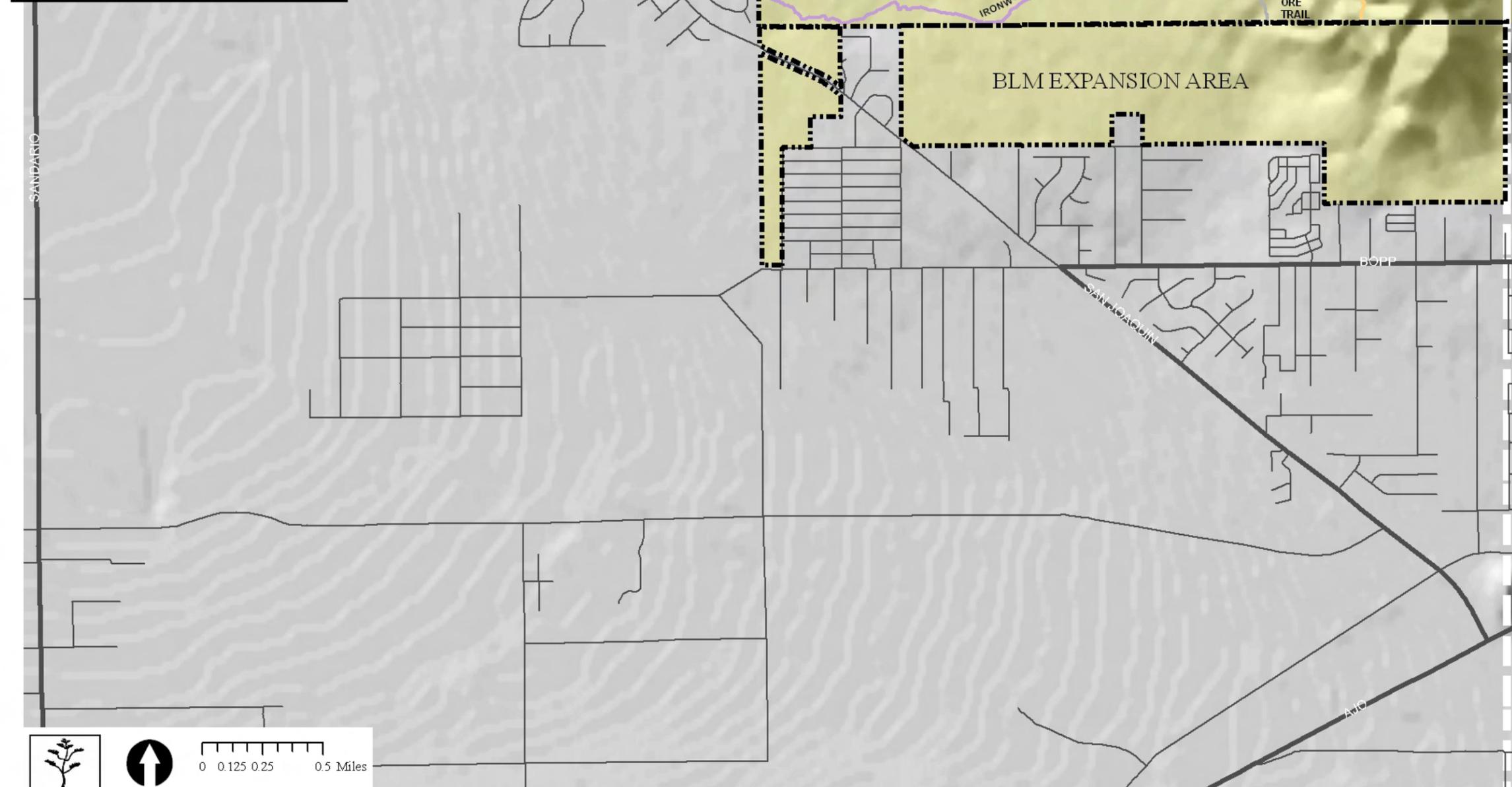
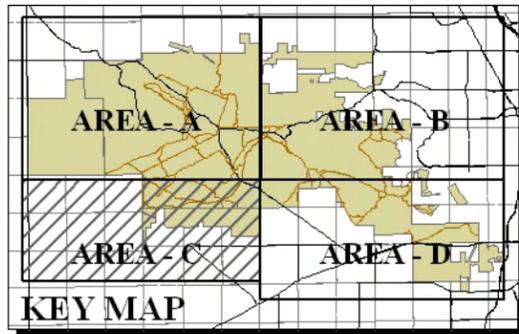
LEGEND

- 36TH STREET TRAIL
- AVERY BRYCE TRAIL
- BOWEN TRAIL
- BROWN MOUNTAIN TRAIL
- CALICHE FLATS TRAIL
- CAMPGROUND TRAIL
- CHAPARRAL TRAIL
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- STARR PASS TRAIL
- TRIPLE C TRAIL
- TUCSON ESTATES TRAIL
- WELL ROAD TRAIL
- YETMAN TRAIL
- ROBLES TRAIL - PLANNED
- POINTS OF INTEREST
- TMP BOUNDARY



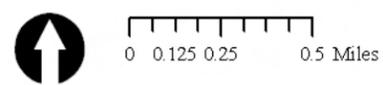
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TUCSON MOUNTAIN PARK
 FIGURE 14-T
 TRAILS MAP
 AREA - C



LEGEND

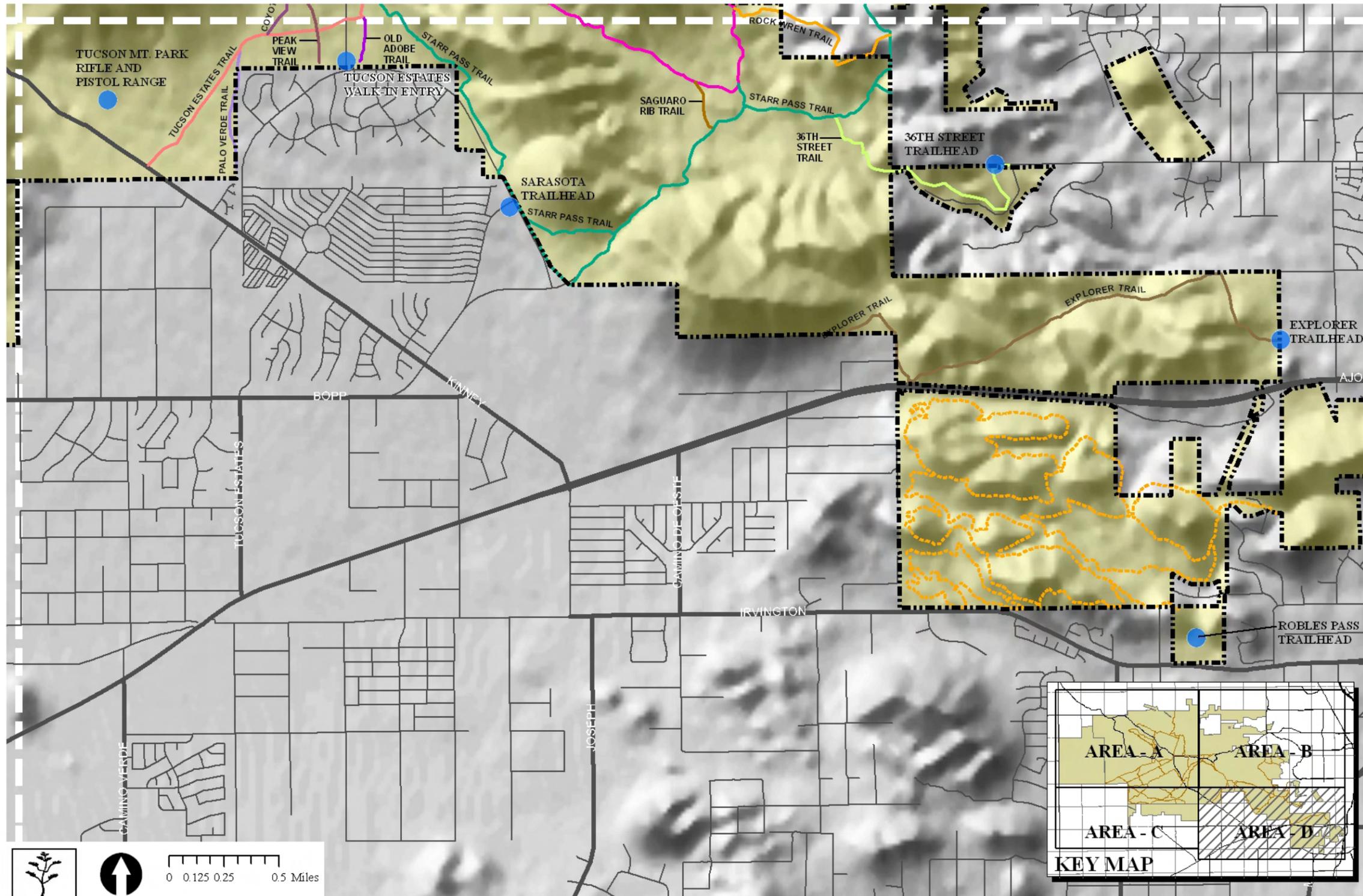
- 36TH STREET TRAIL
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 Pima County Natural Resources, Parks, and Recreation Department

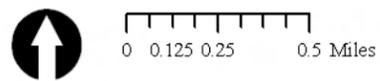
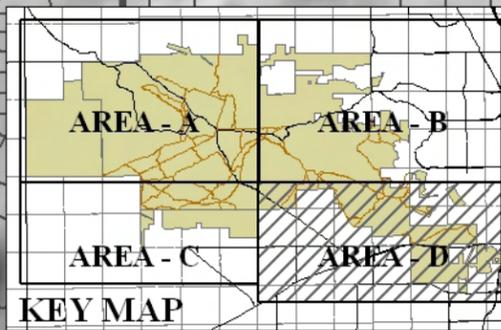
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TUCSON MOUNTAIN PARK
 FIGURE 14-U
 TRAILS MAP
 AREA - D



LEGEND

- 36TH STREET TRAIL
- AVERY BRYCE TRAIL
- BOWEN TRAIL
- BROWN MOUNTAIN TRAIL
- CALICHE FLATS TRAIL
- CAMPGROUND TRAIL
- CHAPARRAL TRAIL
- CHEOPS TRAIL
- COUGAR TRAIL
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- YETMAN TRAIL
- - - ROBLES TRAIL - PLANNED
- POINTS OF INTEREST
- TMP BOUNDARY

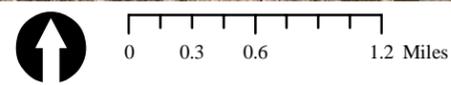
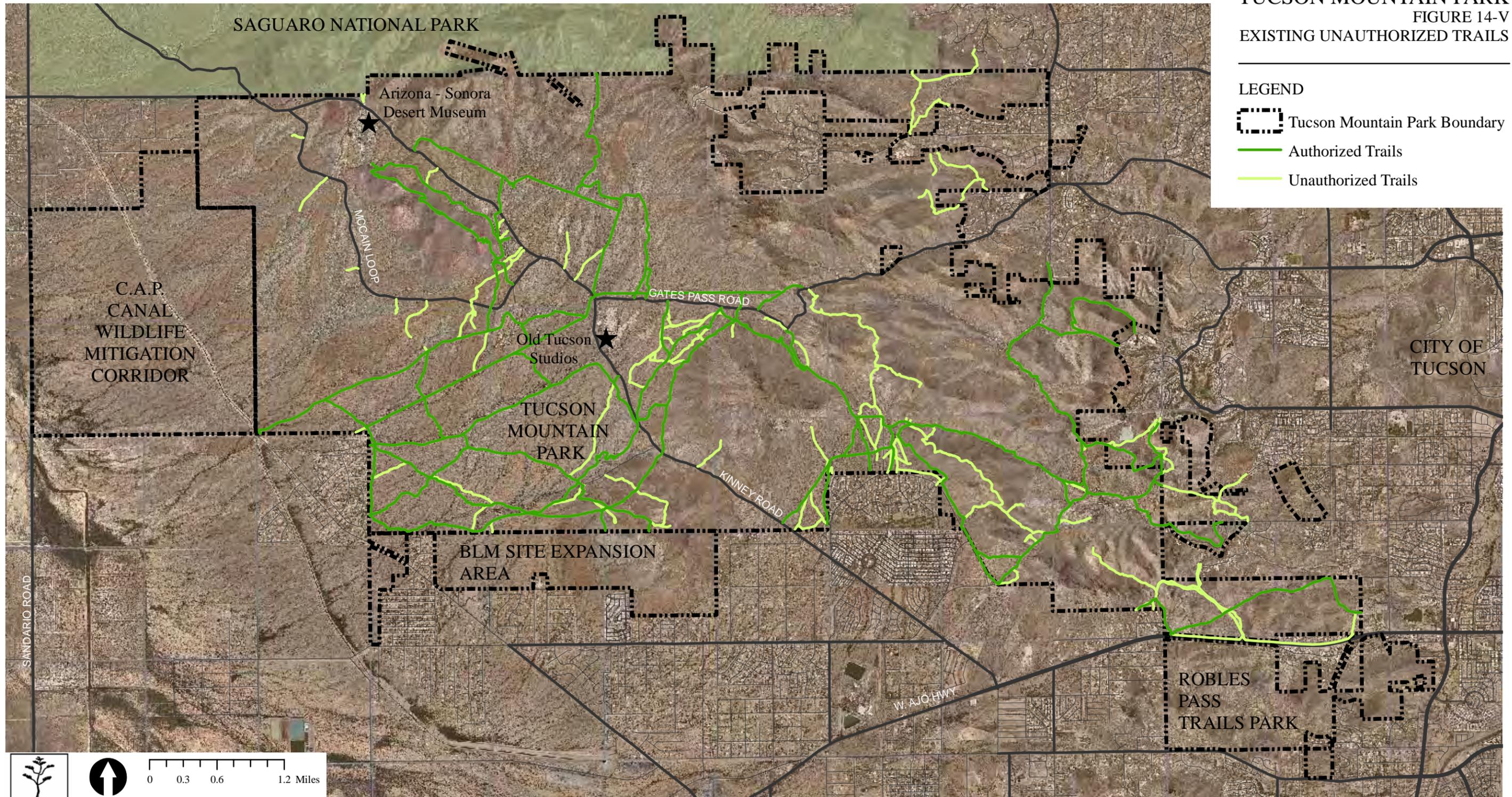


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TUCSON MOUNTAIN PARK
FIGURE 14-V
EXISTING UNAUTHORIZED TRAILS

LEGEND

-  Tucson Mountain Park Boundary
-  Authorized Trails
-  Unauthorized Trails



TUCSON MOUNTAIN PARK MANAGEMENT PLAN
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15.1 Introduction:

To effectively manage a natural resource area such as Tucson Mountain Park, it is important to know how many people visit the site and what activities they engage in. Historically, this information has not been available to the Natural Resources, Parks, and Recreation Department. This is due to the multiple entrances to the park and the lack of staffed contact stations at the various park entrances.

Throughout the history of the park, Pima County has allowed the public to visit the park without assessing a user fee. Given this policy, there has not been a need to build or staff fee collection stations at the three principal roadway entrances to the park. Without facilities of this type, it has been difficult to quantify the number of vehicles and/or persons entering the park.

Additionally, the primary park roads, Kinney Road and Gates Pass Road, are part of the County's public roadway system. Motorists can and do use these roads to commute between various locations in the metropolitan area. With this open access condition, it has been difficult to ascertain what portion of the vehicle traffic is park related and what portion is pass-through commuter traffic.

As part of this project, an attempt was made to establish an order-of-magnitude estimate of park visitation and use. This estimate includes visitation in aggregate and visitation at individual facilities and use areas within the park.

15.2 Basis of Estimate:

Various sources of data were used to prepare the order-of-magnitude park visitation estimate included herein. Included were:

- Paid visitation data (2006) for the Arizona-Sonora Desert Museum as provided by ASDM.
- Paid visitation data (2006) for Old Tucson Studios as provided by the Old Tucson Company.
- Paid campsite rental fees for the Gilbert Ray Campground as collected by the Pima County Natural Resources, Parks, and Recreation Department.
- Paid use data for the Archery Range and Rifle / Pistol Ranges as collected by the Pima County Natural Resources, Parks, and Recreation Department.
- Vehicle traffic counts conducted in March of 2007 at the north and south entrances to the park on Kinney Road and the east entry to the park at Gates Pass Road.
- Observational surveys conducted in March and April, 2007 at the Starr Pass, Camino de Oeste, and King Canyon trailheads.
- Observational surveys conducted in March and April, 2007 at the Gates Pass and G-3 overlooks.
- Electronic trail user counts conducted in March, April, and May 2007 at nine locations within the park.
- Information provided by the Arizona Game and Fish Department related to (archery) hunting tags issued for Tucson Mountain Park.
- Supplemental information / observations as provided by park management staff.

15. Park Visitation and Use

Some of the visitation data collected represents a snap-shot of the use at a specific time of year. This data was adjusted to reflect seasonal variations in use. The visitation pattern observed at the Arizona-Sonora Desert Museum and Old Tucson, with distinct spring and autumn peaks, was used to model the distribution of use over the period of a year.

15.3 Definition of Park Visit:

For purposes of this project, a “visitor” was defined as an individual who engaged in any of the following:

- A person who enters the park to use any of the Pima County maintained facilities. (Campground, picnic areas, overlooks, shooting ranges, etc.)
- A person who enters the park to use any of the trails or back-country areas within the park. (Hikers, trail runners, mountain bikers, equestrians, hunters, etc.)
- A person who enters the park to visit any of the leased facilities. (Arizona-Sonora Desert Museum, Old Tucson, Sonoran Arthropods Studies Inc., including staff and docents working at these facilities).
- A person who enters the park to use the park roadway system, only. (Commuters who do not stop within the park, bicyclists using park roads, etc.).

The duration of stay, be it a few minutes at an overlook or all day on a hiking trail, was not considered. At the campground, each day an individual stayed at the campground was considered a separate visit.

15.4 Overview of Findings:

Based on the above, an order-of-magnitude estimate of visitation at Tucson Mountain Park is as follows:

- Annual Visitation 2,500,000 (+/-)
- Number of Visitors Using Park Facilities 1,400,000 (+/-)
- Percent of Visitors Using Park Facilities 55% (+/-)
- Number of Drive-Through Visitors 1,100,000 (+/-)
- Percent of Drive-Through Visitors 45% (+/-)

An approximate breakdown of visitors who use the park facilities annually (excluding drive-through visitors) is as follows:

- Visitors to the Arizona-Sonora Desert Museum 445,000 (+/-)
- Visitors to the Gates Pass Overlook and G-3 Overlook 425,000 (+/-)
- Visitors to Old Tucson Studios 230,000 (+/-)
- Visitors using other Park Facilities 300,000 (+/-)

15. Park Visitation and Use

An approximate breakdown of annual visitation at other park facilities (exclusive of the Arizona-Sonora Desert Museum, Old Tucson, the Gates Pass Overlook, and the G-3 Overlook) is as follows:

- Hikers and Trail Runners 105,000 (+/-)
- Mountain Bicyclists 50,000 (+/-)
- Overnight Campers (Gilbert Ray Campground) 34,000 (+/-)
- Picnickers 22,000 (+/-)
- Bicyclists using Park Roads 22,000 (+/-)
- Other (leased facility staff, docents, etc.) 18,000 (+/-)
- Rifle / Pistol Range 5,000 (+/-)
- Equestrians 4,900 (+/-)
- Archery Range 2,900 (+/-)
- Hunters (Archery only) 1,200 (+/-)
- Sonoran Arthropods Studies Inc. Program Participants 200 (+/-)

Provided as Figure 15-A, herein, are charts that graphically illustrate estimated annual park visitation.

15.5 Seasonal Variation in Use

Visitation at Tucson Mountain Park exhibits seasonal variation with peaks in the spring and autumn, a moderately high level of use in the winter, and a relatively low level of use in the summer. The estimated distribution of visitation by season is as follows:

- Winter (December, January, February) 25% of Annual Total
- Spring (March, April, May) 32% of Annual Total
- Summer (June, July, August) 15% of Annual Total
- Autumn (September, October, November) 28% of Annual Total

15.6 Automobile Traffic in the Park:

A significant finding of this project was the relatively high and increasing volume of automobile traffic on the park's roads. (See also Section 10, Existing Infrastructure). A comparison of traffic volumes as counted as part of this project in 2007 and as recorded by Pima Associations of Governments (PAG) in 1997 is provided below. (See Figure 15-B).

Kinney Road - South Entry to Park

1997 ADT	1,400
2007 ADT	3,800
Percent Increase	171%

15. Park Visitation and Use

Kinney Road - North Entry to Park

1997 ADT	2,200
2007 ADT	2,900
Percent Increase	32%

Gates Pass Road - East Entry to Park

1997 ADT	2,400
2007 ADT	4,400
Percent Increase	75%

The substantial increase in automobile traffic in the park, nearly half of which is not park related, is an issue of great concern to the Natural Resources, Parks, and Recreation Department. Urban growth in the southwest portion of the Tucson metropolitan area is expected to continue. The construction of the proposed Wal-Mart at the intersection of Ajo Way and Kinney Road is an example of this growth. This retail facility will generate a significant volume of automobile traffic. Some of this traffic will originate in the Picture Rocks area and will utilize Kinney Road through the park to travel to the Wal-Mart.

Growth in this area will also result in even more commuter traffic within the park. Increased traffic will have a negative impact on wildlife, air quality, and the visitor's overall experience. It will also compromise user safety as bicyclists and motor vehicles attempt to use the same park roadways.

15.7 Trail Use in Park:

An additional and important finding of this project was the high level of trail use. It is estimated that approximately 155,000 individuals use the park's trail system annually. Anecdotal evidence suggests that the level of trail use is increasing every year. The degree to which trail use has increased is unknown, as there are no historical baseline trail use counts. None-the-less, the increase is believed to be significant.

As evidence of the increased popularity of Tucson Mountain Park trails, maps prepared by Pima County in the 1980's illustrated a trail system with approximately 27 miles of trails. Mapping conducted in 2007 as part of this project, using global positioning system (GPS) equipment, found that there were over 100 miles of trails in the park. The construction of many of these new trails was not authorized by the Pima County Natural Resources, Parks, and Recreation Department.

To establish baseline trail use data, electronic trail counts were conducted at nine locations during the months of March, April, and May, 2007. The location of these count locations are shown on Figure 15-C. The trail user count locations were recorded to enable follow-up monitoring. The baseline data collected at these locations is summarized below.

15. Park Visitation and Use

Location:	Coordinates:	Average Number of Trail Users per Week
Bowen Trail	N3212.913 - W11103.154	300 / Week
Brown Mountain Trail	N3213.438 - W11108.711	100 / Week
Cougar Trail	N3213.353 - W11107.936	30 / Week
Gates Pass Trail	N3213.343 - W11107.604	35 / Week
Ironwood Trail	N3212.274 - W11107.563	25 / Week
Prospector Trail	N3212.066 - W11107.376	20 / Week
Sarasota Trail	N3212.303 - W11104/025	70 / Week
Starr Pass Trail	N3212.186 - W11102.879	125 / Week
Yetman Trail	N3212.765 - W11105.997	300 / Week

In addition to the total number of trail users, the number of mountain bicyclists using the Tucson Mountain Park trail system is noteworthy. Thirty years ago, the commercially produced mountain bike was in its infancy and it is unlikely that there were more than a handful of mountain bicyclists using the park. Today, some 50,000 mountain bicyclists use the trail annually and the number of cyclists is increasing each year.

15.8 Camping:

Camping at the Gilbert Ray Campground has been consistent in recent years with approximately 34,000 visitors each year. The campground offers a distinct alternative to the commercial campgrounds that offer highly developed, urban amenities. The Gilbert Ray Campground provides a unique opportunity to camp in a developed campground set within in a natural Sonoran Desert setting. The campground also provides a location where students and researchers can stay for a period of days while studying or conducting research in the area.

As noted in Section 13 (Public Use Facilities), the Gilbert Ray Campground is in need of a new Registration Building and various other improvements. The construction of these improvements will ensure that visitors will continue to stay at the Gilbert Ray Campground and that they are able to enjoy a high quality desert camping experience.

15.9 Picnicking:

Picnicking has been a popular activity at Tucson Mountain Park since its establishment in 1928. The park's three picnic areas, Ironwood, Brown Mountain, and Juan Santa Cruz get regular use throughout the year and are very popular in the spring and autumn. It is estimated that 22,000 persons use the park for picnicking each year. As discussed in Section 13 (Public Use Facilities), various improvements are needed at the picnic areas to support this popular activity.

15. Park Visitation and Use

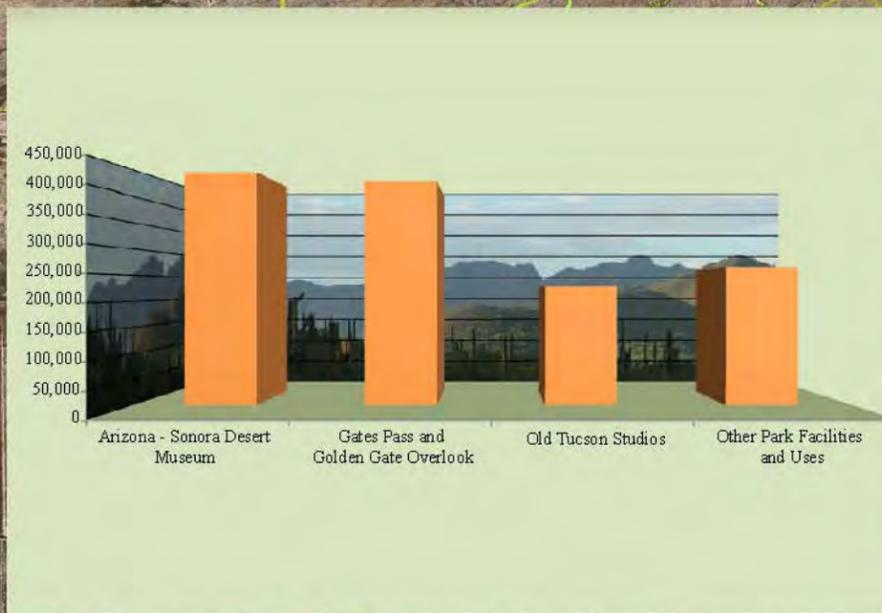
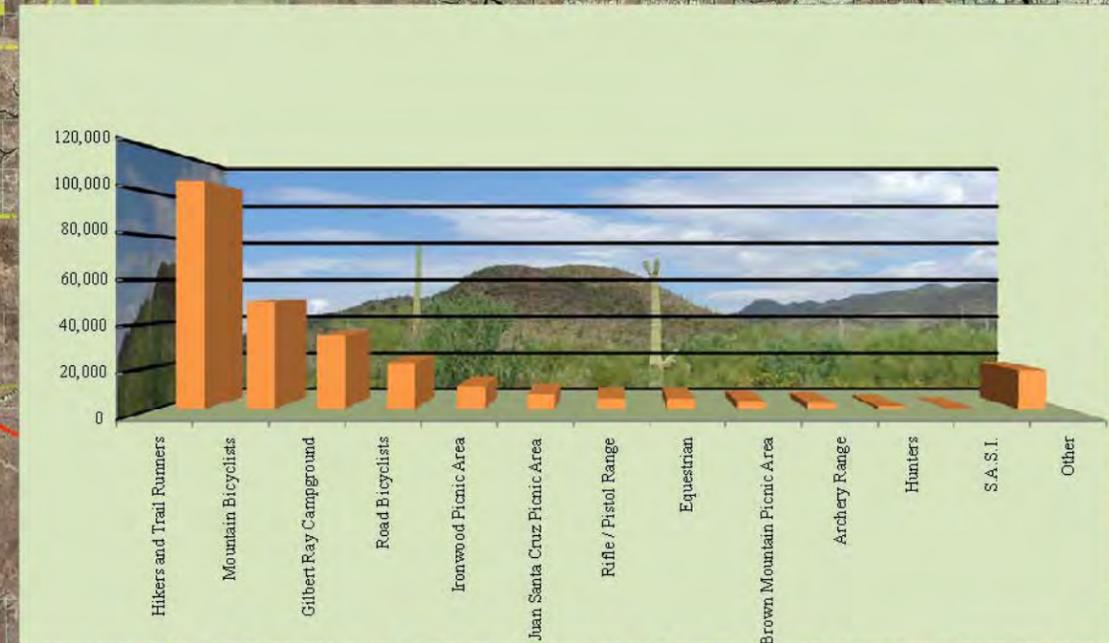
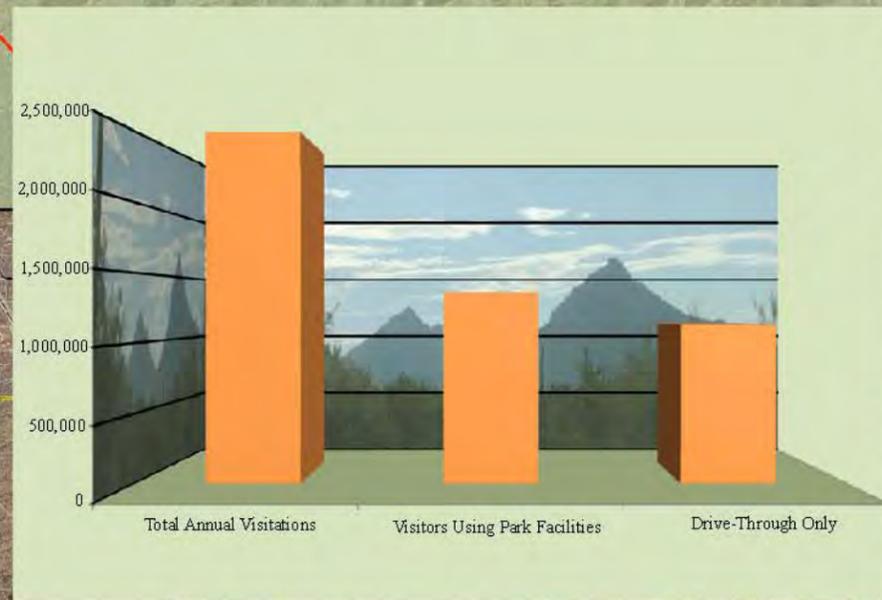
- 15.10 Bicycling:** The scenic roads and challenging hills within Tucson Mountain Park make it a popular location for on-street recreational cycling and training. It is estimated that 22,000 cyclists use the park annually. Due to a scarcity of data, this estimate should be considered an order-of-magnitude estimate, only. More detailed counts should be conducted to confirm or update this estimate.
- The combination of more motor vehicle traffic and more bicycle traffic is of great concern to the Natural Resources, Parks, and Recreation Department. The park roads do not include bike lanes or paved shoulders. This results in motor vehicles and bicycles operating in very close proximity. There is an acute need to address this issue in the interest of public safety.
- 15.11 Rifle / Pistol and Archery Ranges:** The rifle and pistol range attracts approximately 5,000 users annually. The archery range attracts an estimated 2,900 users. Visitation at these facilities has been consistent in recent years and it is anticipated that similar levels of use will continue in the future. These ranges have existed within Tucson Mountain Park for several decades and they address an important need within the context of the overall Pima County park system.
- At the present time, there are no conflicts between the users of these facilities and other park users. This condition could be compromised, however, if users are allowed to enter and/or create trails within the safety zones associated with these facilities.
- 15.12 Equestrian Use:** It is estimated that 4,900 equestrians use the park annually. A small portion of this number are users that trailer their horses to the park to ride. A greater number of equestrians enter the park from adjacent private property and ride on the park's trail system. This activity is most prevalent on the southwest and western edges of the park where there are residential areas that allow for the keeping of horses.
- A significant component of the equestrian activity within the park is related to trail rides conducted by Old Tucson. Some of these occur on property leased by Old Tucson but other trails are also utilized for this purpose.
- 15.13 Hunting:** Archery hunting within Tucson Mountain Park has been an on-going activity for decades and continues to be authorized by the Arizona Game and Fish Department. This activity occurs only during the months of December and January. Approximately 300 permits are issued annually for this purpose. Individuals who receive these permits will typically spend several days during this period in the park either hunting or scouting. It is estimated that hunting results in a total of 1,200 visits to the park annually.

15. Park Visitation and Use

- 15.14 SASI Program Participants:** The Sonoran Arthropods Studies Inc. (SASI) conducts interpretive and educational programs for local school children and members of the public. These programs are typically conducted monthly with approximately 200 visitors participating in the course of a year.
- 15.15 Arizona Sonora Desert Museum Visitors:** The Arizona Sonora Desert Museum attracts approximately 445,000 visitors each year. All of these visitors use park roads for access to the museum. Many also utilize the park's picnic areas, roadside pull-outs, and overlooks in conjunction with their visit.
- 15.16 Old Tucson Studios:** It is estimated that 230,000 persons visit Old Tucson Studios each year. This includes general visitation to the site as well as visitors attending the special events that are conducted at the park from time to time.
- 15.17 Employees, Docents, and Volunteers:** It is estimated that 18,000 employees, docents, volunteers, contractors, and delivery personnel visit the site annually. Most of these individuals are traveling to either the Arizona Sonora Desert Museum or Old Tucson Studios. This estimate is based on limited data and the actual number could be higher. These "visitors" generate a sizeable portion of the motor vehicle traffic that occurs within Tucson Mountain Park.
- 15.18 Other Uses:** A variety of other uses occur within the park. This project did not attempt to estimate the number of visitors engaged in these other activities. Some of these activities are permissible under current regulations, others are not. Observed activities include:
- Animal Collection
 - Animal Release
 - Back-Country / Dispersed Camping
 - Bicycle Racing
 - Birding
 - Bouldering
 - Environmental Education Programs
 - Film Making
 - Mineral Collection
 - OHV (Off-Highway Vehicle) Operation
 - Photography
 - Plant Collection
 - Plant / Fruit Collection (by members of the Tohono O'Odham Nation)
 - Rock Climbing
 - Rock Hounding
 - Wildlife Observation

TUCSON MOUNTAIN PARK

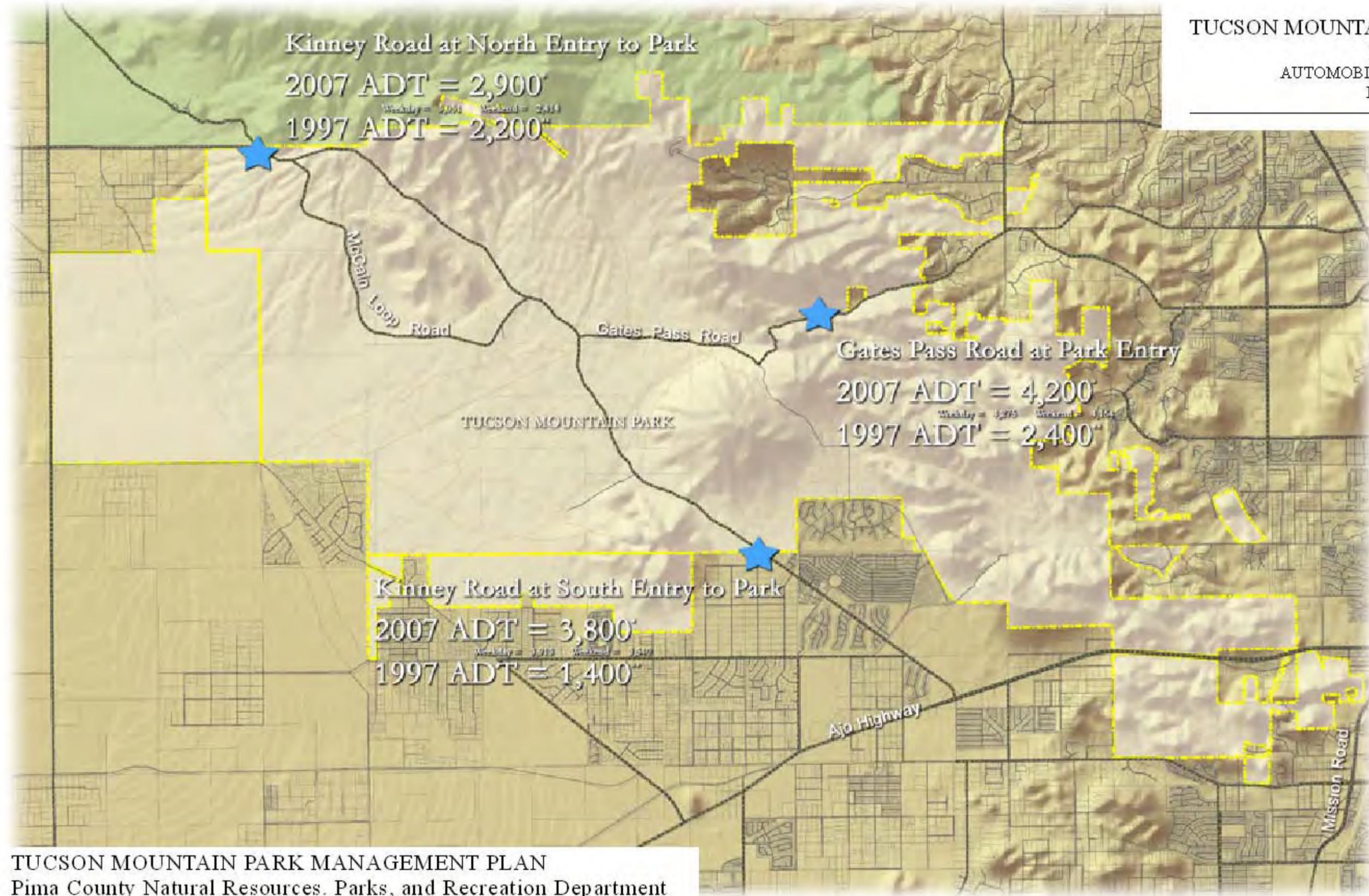
FIGURE 15-A
VISITOR STATISTICS



TUCSON MOUNTAIN PARK MANAGEMENT PLAN
 Pima County Natural Resources, Parks, and Recreation Department
 Prepared by McGann & Associates Landscape Architects and Planners

TUCSON MOUNTAIN PARK

FIGURE 15-B
AUTOMOBILE TRAFFIC
IN THE PARK



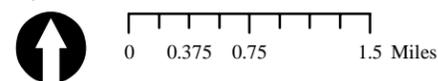
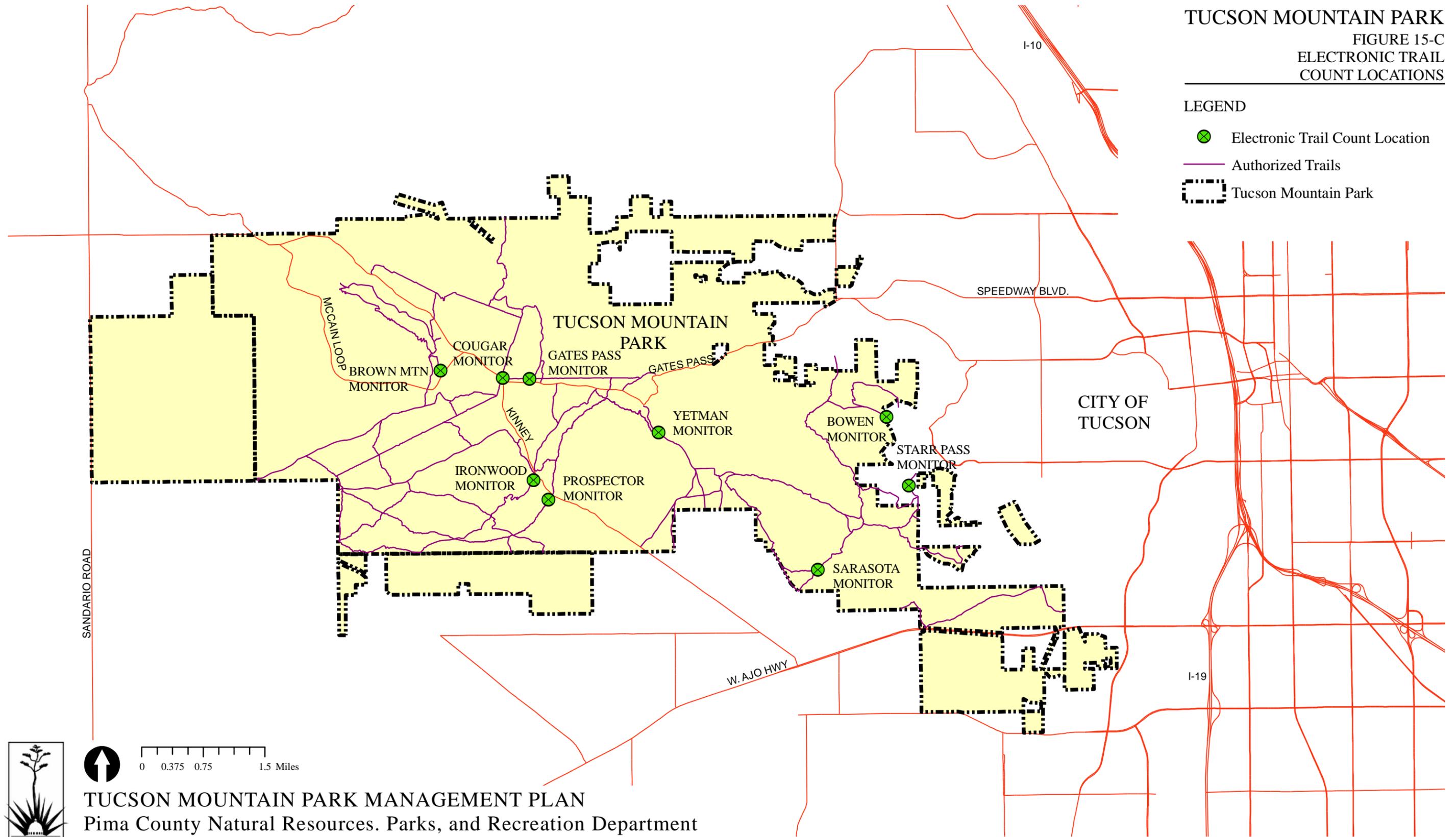
TUCSON MOUNTAIN PARK MANAGEMENT PLAN
Pima County Natural Resources, Parks, and Recreation Department

Prepared by McGann & Associates Landscape Architects and Planners

TUCSON MOUNTAIN PARK
 FIGURE 15-C
 ELECTRONIC TRAIL
 COUNT LOCATIONS

LEGEND

-  Electronic Trail Count Location
-  Authorized Trails
-  Tucson Mountain Park



TUCSON MOUNTAIN PARK MANAGEMENT PLAN
 Pima County Natural Resources, Parks, and Recreation Department
 Prepared by McGann & Associates Landscape Architects and Planners

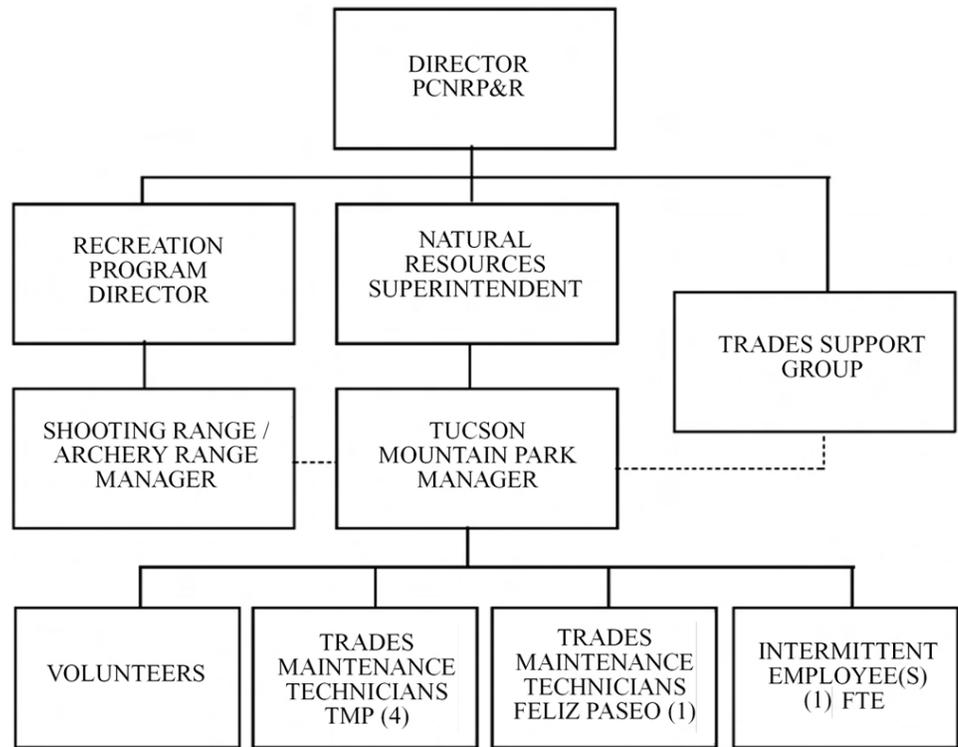
16. Park Administration and Public Safety

16.1 Introduction:

The day-to-day operation of Tucson Mountain Park is coordinated by the Pima County Natural Resources, Parks, and Recreation Department. Law enforcement is provided by a unit of the Pima County Sheriff’s Department. Fire and emergency response is provided by three fire departments including; the Drexel Heights Fire District, the Northwest Fire District, and the Three Points Fire Department.

16.2 Pima Co. Natural Resources, Parks, and Recreation Department Staffing:

Provided below is a chart illustrating the organization of the Pima County Natural Resource, Parks, and Recreation staff as it relates to Tucson Mountain Park.



Natural Resource Superintendent:

The Natural Resource Superintendent is responsible for overseeing and coordinating the management of Tucson Mountain Park. He is also responsible for the management of all of the other mountain parks and preserves in the Pima County system. This system includes numerous sites and approximately 166,000 acres of land.

16. Park Administration and Public Safety

Park Manager:

The Park Manager is responsible for coordinating the day-to-day operation of the park. He is responsible for the maintenance of all County operated sites within Tucson Mountain Park. He is responsible for the monitoring of park resources and for coordinating various restoration and rehabilitation projects. The Park Manager directs and coordinates the activities of trades maintenance technicians, intermittent employees, and volunteers.

Trades Maintenance Technicians and Intermittent Employees:

There are four trades maintenance technicians assigned to Tucson Mountain Park and one assigned to Feliz Paseo Park. These technicians report to the Park Manager and are responsible for facility maintenance and repair, trash removal, and various other activities. An intermittent employee is also assigned to the park from time-to-time. The amount of time the intermittent employee is assigned to Tucson Mountain Park is equal to one (1) FTE.

Volunteers:

Volunteers make up a portion of the park's work force. Tasks coordinated by volunteers include the removal of non-native plants and the periodic repair of campground and picnic area improvements.

Trades Support Group:

The Trades Support Group is located off-site, at the Natural Resources, Parks, and Recreation Department's headquarters. This group includes electricians, plumbers, and other tradesmen. The Park Manager can request the assistance of this group on an as-needed / as-available basis.

Shooting Range and Archery Range Manager:

The Shooting Range and Archery Range at Tucson Mountain Park are operated under the direction of the Department's Recreation Program Manager. On-site supervision and coordination is provided by a Shooting Range / Archery Range Manager.

16.3 Law Enforcement:

Law enforcement within Tucson Mountain Park is provided by the Parks and Search-and-Rescue Unit of the Pima County Sheriff's Department. This unit consists of one sergeant and five officers. This group is responsible for law enforcement within all 200(+) of Pima County's urban parks, mountain parks, and natural preserves.

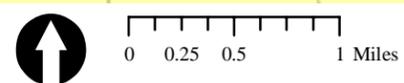
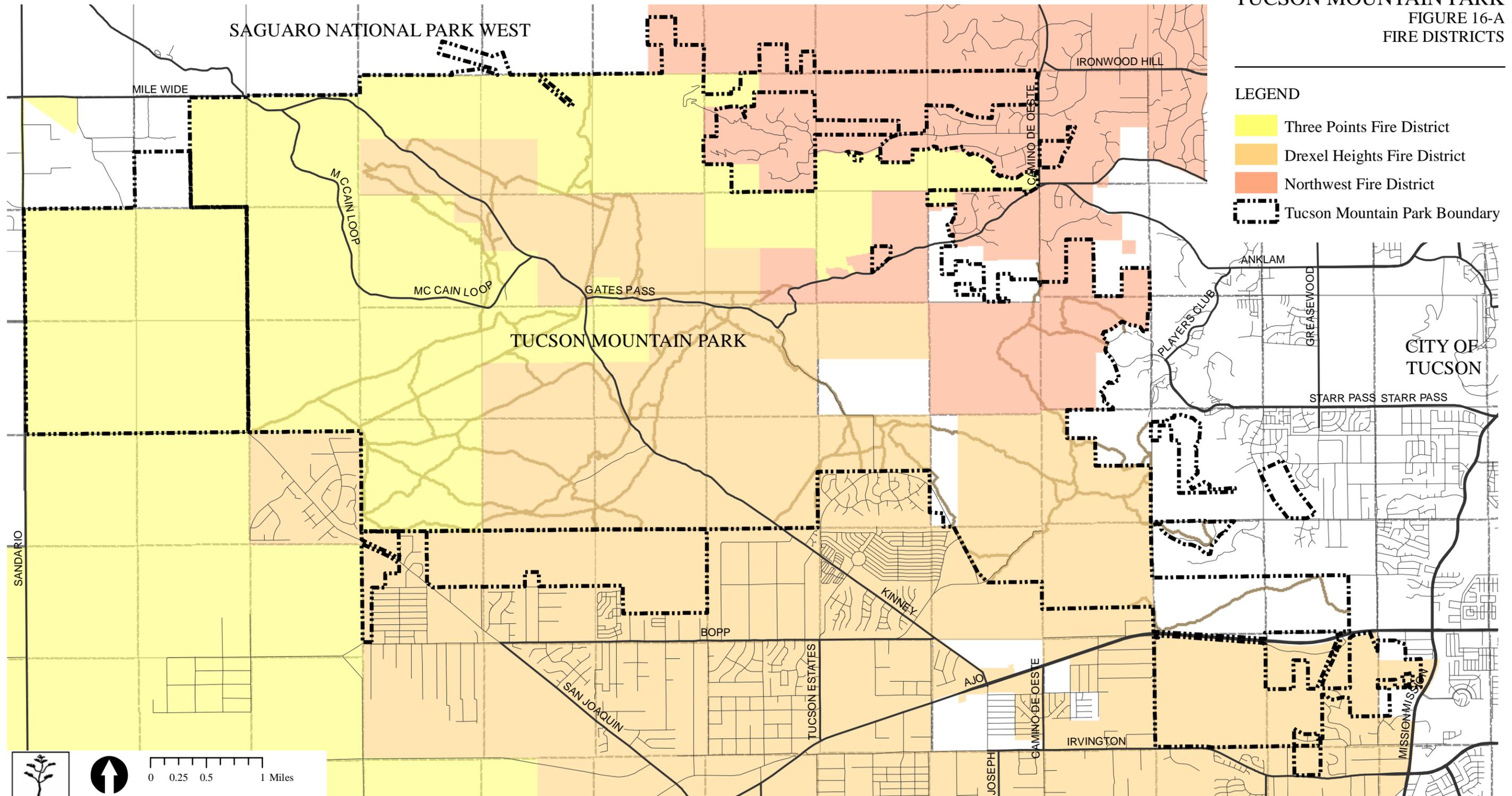
16. Park Administration and Public Safety

Due to the small number of officer's assigned to this group, the law enforcement presence on the park site is limited to periodic patrols of park roads. Under current conditions, officers do not have an opportunity to patrol the trails and back-country portions of Tucson Mountain Park.

16.4 Fire Protection and Emergency Response:

Fire protection and emergency response within the park is provided by three separate fire departments. (See Figure 16-A). The Three Points Fire Department provides protection within the Mitigation Corridor and the western portion of the park. The Drexel Heights Fire District provides protection in the central and southeastern portions of the park as well as the Roble Pass Trails Park area. The Northwest Fire District serves areas in the northeastern portion of Tucson Mountain Park. All of these fire districts assist with emergency response in accordance with established mutual aid procedures.

TUCSON MOUNTAIN PARK
FIGURE 16-A
FIRE DISTRICTS



TUCSON MOUNTAIN PARK MANAGEMENT PLAN
 Pima County Natural Resources, Parks, and Recreation Department

Prepared by McGann & Associates Landscape Architects and Planners

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Appendix A: Cooperative Agreement for Use of Project Lands for Wildlife and Plant Conservation and Management, Tucson Mitigation Corridor, Central Arizona Project

BOR# 0-AA-30-08260

DUPLICATE ORIGINAL CONTRACT

COOPERATIVE AGREEMENT
FOR USE OF PROJECT LANDS
FOR WILDLIFE AND PLANT CONSERVATION AND MANAGEMENT
TUCSON MITIGATION CORRIDOR
CENTRAL ARIZONA PROJECT

NO. 01-05-B-112491-1289

AMENDMENT NO. BOR# 0-AA-30-08260

Number must appear on all invoices, correspondence, and documents pertaining to this contract.

WHEREAS, the Secretary of the Interior on September 24, 1985, selected a plan for construction of the Tucson Aqueduct-Phase B authorized by the Colorado River Basin Projects Act of September 30, 1968 (82 Stat. 886); and

WHEREAS, the Bureau of Reclamation (Reclamation) of the United States Department of the Interior is charged with the responsibility of complying with provisions from the National Environmental Policy Act (NEPA) of 1969 (PL 91-190, as amended), the Endangered Species Act of 1973 (87 Stat. U.S.C. 884), as amended, and the Fish and Wildlife Coordination Act of 1958 (PL 85-624, 16 U.S.C. 661 et seq.); and

WHEREAS, Reclamation has prepared a Final Environmental Impact Statement, Tucson Aqueduct-Phase B, Central Arizona Project (INT FES 85-29) and in it identifies specific environmental commitments and mitigation measures to reduce project environmental impacts to an acceptable level; and

WHEREAS, Reclamation, Arizona Game and Fish Department (AGFD), Fish and Wildlife Service (FWS), and several public conservation groups in the Southwest jointly agreed on a specific parcel of land as partial mitigation for project impacts; and

WHEREAS, the United States has acquired title to 4.25 square miles of land (hereafter referred to as the Tucson Mitigation Corridor) in the State of Arizona to partially mitigate biological impacts from the Tucson Aqueduct-Phase B; and

WHEREAS, the Secretary of the Interior finds that these lands have value for the conservation of wildlife resources other than migratory birds and that the lands have only minor value in carrying out the National Migratory Bird Program; and

WHEREAS, The Secretary of the Interior and the Director of the AGFD find that it would be in the public interest for these lands to be managed for wildlife resources by the Pima County Parks and Recreation Department in accordance with the attached Master Management Plan (Exhibit B); and

WHEREAS, Pima County has authority to enter into management agreements with the Federal Government; and

WHEREAS, lands described herein for fish and wildlife purposes shall not become subject to exchange or other transaction if those actions would defeat the initial purpose of their acquisition [16 U.S.C., section 663(d)]; and,

WHEREAS, Reclamation will provide funds for operation, maintenance, and repair of wildlife facilities within the Tucson Mitigation Corridor for the life of the project, this agreement sets forth terms and conditions necessary for the management of the Tucson Mitigation Corridor by Pima County.

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Appendix A: Cooperative Agreement for Use of Project Lands for Wildlife and Plant Conservation and Management, Tucson Mitigation Corridor, Central Arizona Project

NOW, THEREFORE, UNDER THE AUTHORITY, AND IN ACCORDANCE WITH THE PROVISIONS, OF THE FISH AND WILDLIFE COORDINATION ACT (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), THE SECRETARY OF THE INTERIOR AND THE DIRECTOR OF PIMA COUNTY DO HEREBY APPROVE THIS DOCUMENT AS A GENERAL PLAN AND AGREE THAT:

1. An area comprising approximately 2,514 acres (total acreage minus canal right-of-way) of land shown as the Tucson Mitigation Corridor on Exhibits "A", "B" and "C" enclosed hereto and by this reference made a part hereof, shall be made available by the Department of the Interior to Pima County in the State of Arizona for administration for the conservation and management of plants and wildlife.
2. The responsibilities of each agency are covered in an accompanying Master Management Plan, mutually agreed upon and signed by the Director, Pima County, and the Regional Director, Lower Colorado Region, Reclamation.
3. Further, in order to facilitate proper management and use of this land area, adjustments may be made in the boundaries of the area shown on the enclosed exhibit by addition or deletion of small tracts as may be mutually agreed upon by the Superintendent, Pima County and the Regional Director, Lower Colorado Region, Reclamation, without amendment to this General Plan. Such adjustments may be made by amendment of the aforementioned Master Management Plan.
4. Billings by Pima County to Reclamation shall be prepared on the basis of actual expenditures for salaries, equipment, and transportation costs. All billings will first be reviewed by the Arizona Projects Office of Reclamation prior to approval. Billings shall be made quarterly to the Bureau of Reclamation, Administrative Service Center, Accounting Operations Division, D-2322, P.O. Box 27045, Lakewood, Colorado 80235-0045. Reclamation will transfer funds to Pima County in the amounts required within 30 days after receipt of billing but not to exceed the total available for any given appropriation period.
5. The performance of any obligation or the expenditure of any funds by the Government under this agreement is contingent upon the necessary appropriations and funds being allocated and made available for the work required hereunder. Nothing in this agreement shall be construed as delegating Pima County or Reclamation to expend money in excess of appropriations authorized by law and administratively allocated for this work.
6. All rights granted under this General Plan shall be subject to existing rights-of-way of record.
7. This Agreement may be amended, supplemented, extended or superseded at any time by subagreements thereto and/or by a written agreement between Pima County and Reclamation. Amendments will identify the specific actions to be taken, cost reimbursements, funding mechanisms, and coordination details.
8. This agreement may be terminated by either party by provision of 60 days written notice to the other.

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Appendix A: Cooperative Agreement for Use of Project Lands for Wildlife and Plant Conservation and Management, Tucson Mitigation Corridor, Central Arizona Project

9. Title to these lands shall remain in the name of the United States. Failure to administer the lands for the conservation and management of plant and wildlife resources as identified in the Master Management Plan will result in the termination of agreements with Pima County and the transfer of management responsibilities back to Reclamation unless the departure is agreed upon by both parties and reflected in a modification of the Master Management Plan.

10. This agreement is subject to the provisions of A.R.S. 38-511 which provides in pertinent part:

The state, its political subdivisions or any department of either may, within 3 years after its execution, cancel any contract, without penalty or further obligation, made by the state, its political subdivisions, or any of the departments or agencies of either if any person significantly involved in initiating, negotiating, securing, drafting or creating the contract on behalf of the state, its political subdivisions or any of the departments or agencies of either is, at any time, while the contract or any extension of the contract is in effect, an employee or agent of any other party to the contract in any capacity or a consultant to any other party to the contract with respect to the subject matter of the contract.

IN WITNESS WHEREOF, the parties hereto have affixed their signature and date thereof on triplicate copies hereof, as follows:

PIMA COUNTY

By *Barry Super* Date: 11/8/89
Deputy Pima County Attorney *Approved as to form*
By *[Signature]* Date: NOV 28 1989
Chairman
Pima County Board of Supervisors

ATTEST:

STATE OF ARIZONA

By *W. S. [Signature]* Date: 1-24-90
Director
Arizona Game and Fish Department
Lois Anderson, Deputy
Clerk, Board of Supervisors
Pima County, Arizona

THE UNITED STATES OF AMERICA
DEPARTMENT OF THE INTERIOR

By *[Signature]* Date: 5-17-90
Regional Director
Lower Colorado Region

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Appendix B: Tucson Mitigation Corridor Master Management Plan

TUCSON MITIGATION CORRIDOR Master Management Plan

I. Area Description:

1. Location:

The area is located in Pima County, Arizona, Township 14 south, Range 11 east, SW1/4 section 2, sections 10, 11, 14, and 15. The area is bordered on the east by Pima County Tucson Mountain Park and on the west by the Tohono O'odham Nation (Nation).

2. Acreage:

The Tucson Mitigation Corridor (TMC) area consists of approximately 2,514 acres in two tracts separated by the Central Arizona Project (CAP) aqueduct, which consists of approximately 216 acres through this area.

3. Ownership:

The United States Department of the Interior holds title to all 2,730 acres in this area. Approximately 216 of these acres were obtained from The State of Arizona for the CAP, Tucson Aqueduct-Phase B right-of-way under the Arizona-New Mexico Enabling Act. A total of 2,354 acres were purchased in fee from the State of Arizona by monetary compensation. The remaining 160 acres were purchased in fee from a private owner by monetary compensation. Management responsibility for conservation of plant and wildlife resources of the 2,514 acres outside of the aqueduct right-of-way resides with Pima County under agreement of the General Plan between Pima County and Bureau of Reclamation (Reclamation). All rights granted under this Master Management Plan shall be subject to existing rights-of-way of record.

4. Soils:

The Tucson Mountains, which are adjacent to the TMC are composed of granitic, volcanic, and metamorphic rocks. Loose and caliche-cemented alluvial fan and basin fill deposits constitute most of the foundation. The sediments are typically silt and clay fines and sands with lenses of gravel.

5. Topography:

The TMC is located near the eastern edge of the Basin and Range Physiographic Province and is characterized as the foothills of the Tucson Mountains. Elevations range from 2,260 feet at the southwestern edge to 2,700 feet at the northeastern end.

6. Climate:

The climate is characterized by long hot summers, short mild winters, sparse rainfall periods that occur twice a year in winter and late summer, low relative humidity, and high rates of evaporation. Average annual

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Appendix B: Tucson Mitigation Corridor Master Management Plan

precipitation is about 11 inches with the maximum range of temperatures from 16°F in January to 111°F in July. The average annual maximum daily temperature is 81.7°F, with an average annual minimum daily temperature of 54.2°F.

7. Water Resources:

The area contains no naturally occurring permanent water sources. There is an existing well, several stock tanks that collect natural run-off, one wildlife drinker which will be fed with water from the Tucson Aqueduct, and one wildlife drinker fed with water from a well. A great deal of water passes through the ephemeral washes within the area during storm runoffs.

8. Vegetative Communities:

The TMC consists of two predominant vegetative communities, the palo verde-cacti-mixed scrub and creosote-bursage.

a. Palo verde-cacti-mixed scrub: 75 percent of area, predominant species include:

Palo verde (Cercidium microphyllum)
Saguaro (Carnegiea gigantea)
Catclaw (Acacia greggii)
Brittlebush (Encelia farinosa)
Desert hackberry (Celtis pallida)
Various cholla species (Opuntia spp.)
Barrel cactus (Ferocactus spp.)
Hedgehog cactus (Echinocereus spp.)

b. Creosote-bursage: 25 percent of area, predominant species include:

Creosote (Larrea tridentata)
Triangle-leaf bursage (Ambrosia deltoidea)
White-thorn acacia (Acacia constricta)
Mesquite (Prosopis velutina)

9. Wildlife and Plant Resources

a. Important wildlife species which inhabit the area are:

Mule deer (Odocoileus hemionus)
Javelina (Tayassu tajacu)
Coyote (Canis latrans)
Grey fox (Urocyon cinereoargenteus)
Kit fox (Vulpes macrotis)
Bobcat (Lynx rufus)
Harris' hawk (Parabuteo unicinctus)
Desert tortoise (Xerobates agassizii) (Federal Candidate Category 2)
Gila monster (Heloderma suspectum) (Federal Candidate Category 2)

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Appendix B: Tucson Mitigation Corridor Master Management Plan

- b. Special status plant species occurring within the TMC include:

Tumamoc globe-berry (Tumamoca macedougalii)

(Federally endangered)

Thornber's fishhook cactus (Mammillaria thornberi)

(Federal Candidate Category 2)

Night-blooming cereus (Peniocereus greggii)

(Federal Candidate Category 2)

10. Historic Use and Current Conditions:

This area remained in a natural condition until cattle grazing began. This grazing continued until acquisition by Reclamation was final. A portion of the area has been used as an illegal dump by local residents. Garbage in the dump was removed by the Tucson Aqueduct Reach 5 contractor in 1987. At present the only man-made developments on the area are unimproved trails, stock fences, stock tanks, a well, underground gas and telephone lines, and the CAP aqueduct.

The CAP right-of-way, as shown on Exhibit C, will be managed by Reclamation and the Central Arizona Water Conservation District for the operation of the CAP aqueduct. These management activities will include, but not be limited to, the maintenance of dikes and cross-drainages, and the use of borrow materials within the right-of-way.

II. Management Plan:

1. Management Goals:

a. Compensate for wildlife movement disruptions caused by aqueduct construction by providing an undeveloped wildlife movement corridor between the Tucson Mountains and the Nation to the west.

b. Preserve areas containing the Federally Endangered Tumamoc globe-berry and the night-blooming cereus, Thornber's fishhook cactus desert tortoise, and Gila monster (all Federal Candidate Category 2 species) as compensation for populations impacted by project construction.

c. Compensate for wildlife habitat lost due to aqueduct construction by prohibiting deleterious activities within the area boundaries.

2. Management Actions:

a. Prohibit any future developments within the area other than existing wildlife habitat improvements described above or future wildlife improvements, management, or developments agreed to by Reclamation, Arizona Game and Fish Department (AGFD), Fish and Wildlife Service (FWS), and Pima County. This will preserve this fragile desert habitat from urbanization and maintain an open wildlife movement corridor.

b. Prohibit grazing, mining, dumping, discharge of firearms, trapping, recreation developments, and off-road vehicles to maintain the integrity of the area for both wildlife and special status plant species.

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Appendix B: Tucson Mitigation Corridor Master Management Plan

Prohibited activities will be regulated according to Chapter 12 of the Parks and Recreation Commission, Pima County, under authority A.R.S. 11-931 et seq.

- c. Maintain and repair 2 wildlife watering sites within TMC.
- d. Post and maintain signs around the TMC.
- e. Ensure that trash is kept out of the TMC.
- f. Maintain and repair 4-strand fences on perimeter of TMC.
- g. Maintain locked gates on perimeter of TMC to exclude unauthorized motor vehicles.
- h. Enforce all laws and regulations set forth in this document, and by the State of Arizona, for the entire 2,730 acres, including the 216 acre CAP right-of-way.

3. Problems Related to Attainment of Management Goals:

a. Arizona Department of Transportation has proposed the extension of San Joaquin Road along the gas pipeline road which extends through the middle of the TMC. This road would impact wildlife movements through the corridor and negate one of the management goals. Alternative routes have been identified and discussed with the Pima County Department of Transportation.

b. Part of the TMC has been used by the local residents as a dump site. The garbage in this dump has been removed and the perimeter of the TMC has been fenced to prohibit this activity. It is anticipated that some local residents will resent this exclusion and attempt to continue to use the area as a dump. Daily patrols by Pima County will minimize these activities.

c. The gas pipeline road has been used as a short-cut route for local residents. We anticipate that the local residents will resent the loss of access to this route across the TMC and persist in cutting the fence to maintain that access. Daily patrols by Pima County will minimize these activities.

III. Estimated Annual Operation, Maintenance, and Repair:

1. Repairs and yearly maintenance \$ 2,000.00
2. Vehicle operating cost
patrol 8.5 mile circuit (fenced area) daily
3,102.5 miles at \$ 0.36 per mile \$ 1,116.90
3. Ranger patrols and overhead costs
two hours daily at \$16.27 per hour \$11,877.10
4. Report time including annual report preparation
15 minutes daily at 16.27 per hour ranger cost \$ 1,484.64

Total Annual Management Cost: \$16,478.64

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Appendix B: Tucson Mitigation Corridor Master Management Plan

IV. Reports and Review:

1. Pima County will provide Reclamation with an annual report that discusses the following:

- a. The type and amount of work performed to date.
- b. Current problems which may impede performance and proposed corrective action.
- c. The work to be performed during the next reporting period.

2. Reclamation will review the yearly report and determine whether or not the existing management is proceeding according to the Master Management Plan. Changes will be made where appropriate upon agreement by both Pima County and Reclamation.

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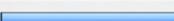
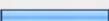
Appendix C: Tucson Mountain Park Management Plan Survey

3. In the past two years, if you used trails within Tucson Mountain Park, which trailheads and trails did you use?		
		Response Count
		193
<i>answered question</i>		193
<i>skipped question</i>		169

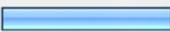
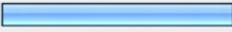
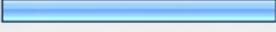
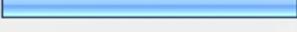
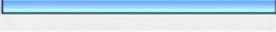
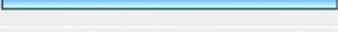
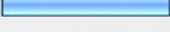
4. In the past two years, what activities have you participated in while in Tucson Mountain Park?			
		Response Percent	Response Count
Commuting		27.4%	96
Sightseeing		67.2%	236
Hiking		65.8%	231
Mountain Biking		20.2%	71
Road Biking		12.5%	44
Equestrian Use		4.3%	15
Camping		4.0%	14
Picnicking		26.8%	94
Bow Hunting		11.4%	40
Archery		19.1%	67
Rifle or Pistol Shooting		13.1%	46
Environmental Education		16.8%	59
Photography		43.3%	152
Painting		2.8%	10
Other Art		2.6%	9
Contemplation		28.2%	99
Other Activities (please specify)		17.7%	62
<i>answered question</i>			351
<i>skipped question</i>			11

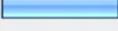
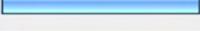
Appendix C: Tucson Mountain Park Management Plan Survey

5. How do you rate your experience at Tucson Mountain Park?								
	Poor	Below Average	Average	Above Average	Excellent	N/A	Rating Average	Response Count
Trails and Trailheads	0.3% (1)	3.3% (10)	24.4% (75)	30.9% (95)	27.7% (85)	13.4% (41)	3.95	307
Picnic Areas	0.4% (1)	3.3% (9)	30.2% (83)	25.1% (69)	15.6% (43)	25.5% (70)	3.70	275
Gilbert Ray Campground	1.3% (3)	1.3% (3)	16.4% (38)	11.6% (27)	11.6% (27)	57.8% (134)	3.73	232
Archery Range	0.4% (1)	2.0% (5)	9.0% (22)	10.2% (25)	9.8% (24)	68.6% (168)	3.86	245
Rifle and Pistol Range	0.9% (2)	0.4% (1)	9.5% (22)	7.3% (17)	6.9% (16)	75.0% (174)	3.76	232
<i>answered question</i>								341
<i>skipped question</i>								21

6. What facility improvements would you like to see at Tucson Mountain Park?			
		Response Percent	Response Count
Better Trail Signage		47.7%	145
Bike Lanes on Park Roads		42.1%	128
Reservable Group Use Area		8.6%	26
Visitor Center		18.1%	55
Environmental Education Amphitheater		14.1%	43
Dogs On Leash Allowed		29.9%	91
Enhance Picnic Areas		18.1%	55
Enhance Campground		10.2%	31
Revegetation of Disturbed Areas		49.0%	149
Other Improvements (please specify)		38.2%	116
<i>answered question</i>			304
<i>skipped question</i>			58

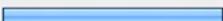
Appendix C: Tucson Mountain Park Management Plan Survey

7. What program improvements would you like to see at Tucson Mountain Park?			
		Response Percent	Response Count
Family Hikes		28.8%	66
Birding Walks		39.3%	90
Geology Walks		46.7%	107
Nature Walks		50.2%	115
History/Archaeology Walks		46.7%	107
Night Sky Viewing		57.2%	131
Bike Tours		16.2%	37
Environmental Education Programs at Gilbert Ray Campground		28.4%	65
Other Programs (please specify)		20.5%	47
		<i>answered question</i>	229
		<i>skipped question</i>	133

8. Would you be willing to pay a small fee for educational and interpretive programs at Tucson Mountain Park?			
		Response Percent	Response Count
Yes		47.3%	148
No		19.5%	61
Neutral		33.5%	105
		<i>answered question</i>	313
		<i>skipped question</i>	49

Appendix C: Tucson Mountain Park Management Plan Survey

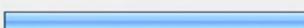
9. Many social trails have been built within Tucson Mountain Park. Would you like to see fewer, but better maintained, trails?			
		Response Percent	Response Count
Yes		42.0%	131
No		19.9%	62
Neutral		38.5%	120
<i>answered question</i>			312
<i>skipped question</i>			50

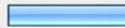
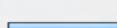
10. The trail system currently serves multiple uses including hiking, mountain biking, road biking, and equestrians. Would you like to continue this strategy, or separate trail use?			
		Response Percent	Response Count
Continue current multiple use strategy		57.0%	175
Designate some trails for specific uses		37.5%	115
Designate all trails for specific uses		5.9%	18
<i>answered question</i>			307
<i>skipped question</i>			55

11. Visitors to Tucson Mountain Park are not currently restricted to designated trail routes. Would you like to see designated trails with off-trail use by permit only?			
		Response Percent	Response Count
Yes		31.9%	100
No		50.2%	157
Neutral		18.2%	57
<i>answered question</i>			313
<i>skipped question</i>			49

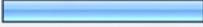
Appendix C: Tucson Mountain Park Management Plan Survey

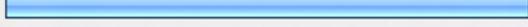
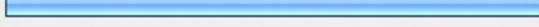
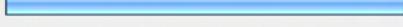
12. Tucson Mountain Park currently closes at dusk. Do you support the idea of improving the utility infrastructure (electric, water) to enhance the park facilities for use after dark?			
		Response Percent	Response Count
Yes		25.3%	80
No		58.2%	184
Neutral		16.8%	53
<i>answered question</i>			316
<i>skipped question</i>			46

13. What do you think about making Gates Pass Road one way coming into the park from Tucson, and using the extra lane for road biking? Return access to Tucson would be via Ajo Hwy. or Sandario Road.			
		Response Percent	Response Count
Support this idea		21.1%	67
Need to know more information		19.6%	62
Don't support this idea		55.5%	176
Neutral		4.1%	13
<i>answered question</i>			317
<i>skipped question</i>			45

14. Dogs are not allowed in Tucson Mountain Park except at Gilbert Ray Campground. Do you think that park rule should be revisited?			
		Response Percent	Response Count
Yes		21.6%	68
No		40.6%	128
Establish specific dog on-leash areas		20.0%	63
Neutral		7.6%	24
Please suggest areas for dogs on-leash.		10.5%	33
<i>answered question</i>			315
<i>skipped question</i>			47

Appendix C: Tucson Mountain Park Management Plan Survey

15. Would you support a small entrance fee in exchange for enhanced park facilities?			
		Response Percent	Response Count
Support this idea		17.4%	55
Need to know more information		34.4%	109
Don't support this idea		42.0%	133
Neutral		6.6%	21
		answered question	317
		skipped question	45

16. Please provide your contact information.			
		Response Percent	Response Count
Name:		99.6%	249
Company:		20.4%	51
Address:		85.6%	214
Address 2:		4.0%	10
City/Town:		91.2%	228
State/Province:		90.4%	226
ZIP/Postal Code:		92.4%	231
Country:		68.8%	172
		answered question	250
		skipped question	112

Appendix C: Tucson Mountain Park Management Plan Survey

17. Please provide your phone number.		Response Count
		158
	<i>answered question</i>	158
	<i>skipped question</i>	204

18. Please provide your email address.		Response Count
		211
	<i>answered question</i>	211
	<i>skipped question</i>	151