

DRAFT

Resources of the Western Pima County Subarea

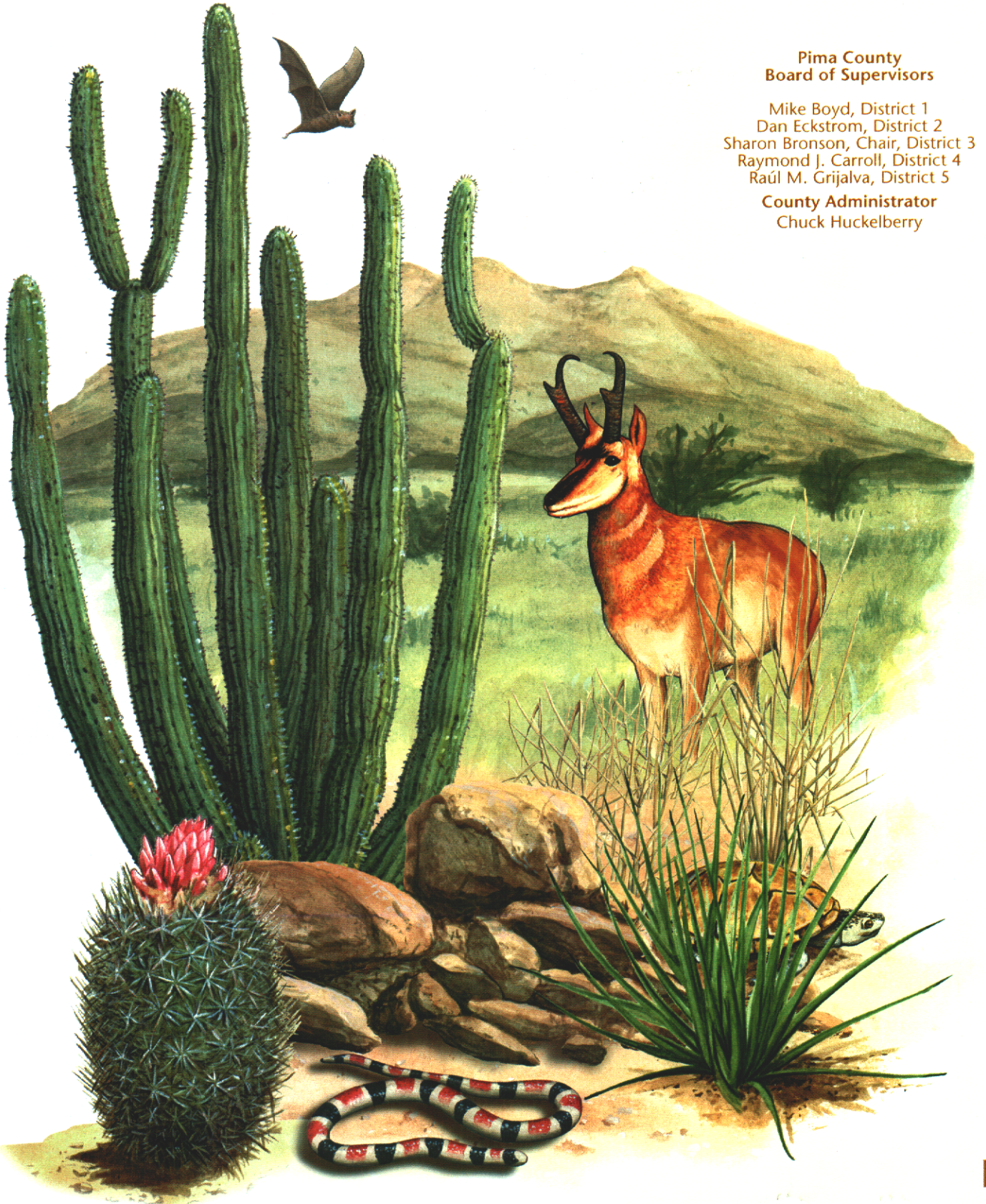
Sonoran Desert Conservation Plan

May 2000

**Pima County
Board of Supervisors**

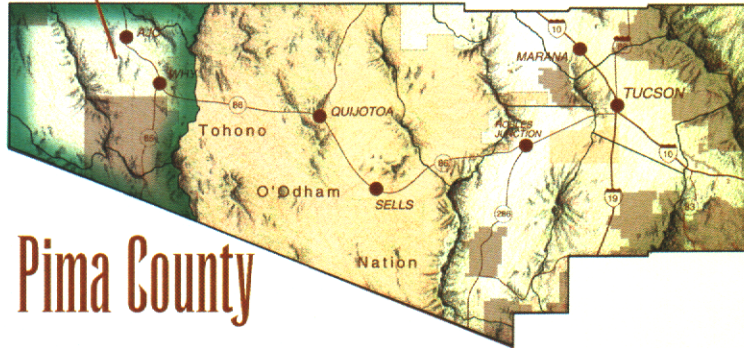
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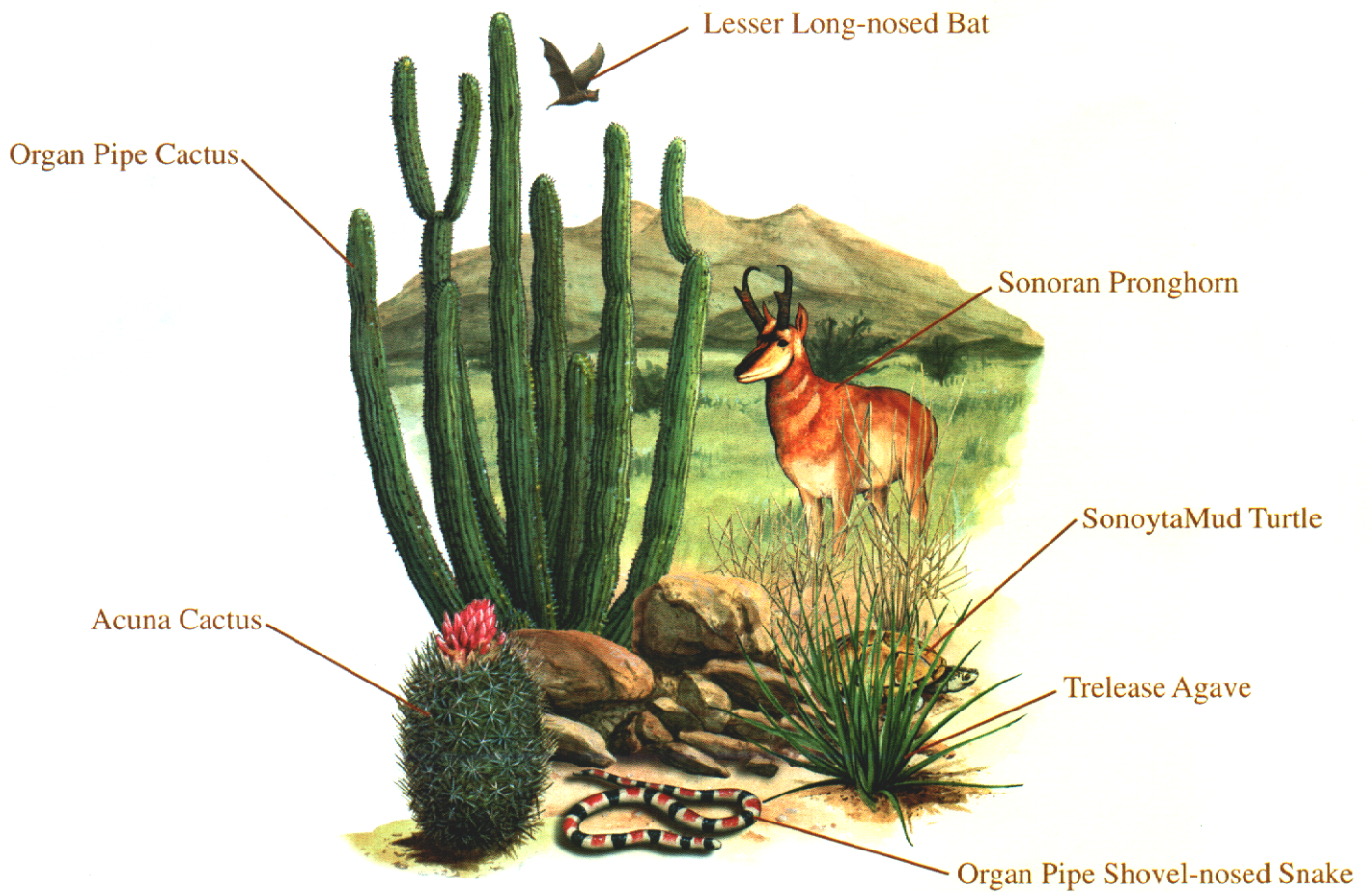


Sonoran Desert Conservation Plan

Western Pima County
Subarea



Pima County



Current and former inhabitants of Western Pima County



MEMORANDUM

Date: May 18, 2000

To: The Honorable Chair and Members
Pima County Board of Supervisors

From: C.H. Huckelberry
County Administrator

A handwritten signature in black ink, appearing to be "CHH", is written over the printed name "C.H. Huckelberry".

Re: *Resources of Western Pima County*

I. Background

This memorandum provides a brief summary of a compilation of resource investigations that have been submitted so far, to help develop the Sonoran Desert Conservation Plan within the watershed planning area of Western Pima County. The Steering Committee, interested members of the public, and stakeholding private citizens and governmental entities are invited to submit additional documents and comments. Presentations at the May 20, 2000 Steering Committee meeting will be followed by subarea land panel meetings for all interested parties so that topics ranging from biological, to riparian, to ranch, to cultural, land and fiscal resources can be discussed in greater detail. Contributions resulting from the subarea process will be forwarded to the Steering Committee, Technical Teams, and the Board of Supervisors for consideration.

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II. Habitat and Corridors Elements

Biological Stress Assessment and Review of Vulnerable Species

Attachment 1 is Western Pima County chapter from the *Biological Stress Assessment*, issued by Recon consulting as part of the biological evaluation in March of 2000. The *Biological Stress Assessment* examines past land and water uses, existing uses, and some major uses foreseeable over the next 30 years in an effort to determine the greatest potential threats to vulnerable species within each watershed planning unit.

The Western Pima County subarea is discussed in pages 180 through 198 of the text. A summary of the stress analysis is available in Table 39, and reproduced in part below.

Areas and Habitats of Concern	Species, Federal Concern	Sources of Stress
Areas of shallow groundwater	Pygmy-owl	Overflights
Riparian and xeroriparian habitat	Lesser long nosed bat	Livestock grazing, recreation
Aquatic and riparian habitat	Sonoran pronghorn	Groundwater pumping
Mine adit	Desert pupfish	Mining
Ironwood plant communities		Invasive species
Palo verde mixed scrub		Resource damage at boarder

Potential threats and stressors to other vulnerable species in the Western Pima County subarea, including species of federal concern, are discussed in the report such as the:

- Trelease Agave;
- Organ Pipe shovel-nosed snake;
- Red-backed whiptail lizard;
- Acuna cactus;
- Sonoyta mud turtle;
- Ajo rock daisy;
- Quitobaquito tryonia (snail); and
- Tumamoc globeberry.

III. Riparian Element

A report issued in April of 2000, entitled *Prioritization of Streams for Conservation in Pima County*, described a number of streams within watershed planning units and prioritized these streams according to their existing contribution to the overall conservation of biological diversity in Pima County. Streams that ranked in the top 20 by the following parameters are recommended for priority consideration in identifying areas for further analysis by the scientists assisting in the development of the Sonoran Desert Conservation Plan:

- perennial stream length and intermittent stream length
- area of hydro-mesoriparian vegetation and of xeroriparian Class A vegetation
- area of shallow groundwater
- presence of native fish.

A very small percent of the priority streams within the County are found within the Western Pima County subarea.

SDCP Planning Unit	Number of Priority Streams	Percentage of Total
1. Middle San Pedro	8	12
2. Cienega Rincon	17	26
3. Upper Santa Cruz	3	4
4. Middle Santa Cruz	9.5	15
5. Tortolita Fan	5.5	8
6A. Altar Valley	18	28
6B. Avra Valley	2	3
7. Tohono Nation	1	2
8. Western Pima Co.	1	2
Total	65	100

Pima County's Watersheds and Watercourses

Attachment 2 is a chapter of a watershed and watercourse study by authors including Barbara Tellman of the Arizona Water Resources Research Center. Human impacts on the Western Pima County watershed are described, along with existing public and private land uses and projected land uses. The report identifies issues for discussion in achieving a goal of watercourse protection. The Western Pima County subarea is discussed in pages 151 through 158 of the text.

Potential and existing impacts on the watercourses in the Western Pima County subarea

REGION WITHIN THE SUBAREA	GRAZING	WILDCAT SUBDIVISION	PLANNED SUBDIVISION	COPPER MINE	SAND & GRAVEL MINE	PUMPING	AGRICULTURE	REC
AJO / WHY		yes	yes	yes		yes		
PUBLIC LANDS	yes							yes

Potential options for reducing stress on watercourses within the Western Pima County subarea

REGION WITHIN THE SUBAREA	LESS PUMPING (ALT WATER)	NON STRUC FLOODPLAIN MANAGE	LAND USE MANAGEMENT	FEDERAL LAND, PROTECTION	STATE TRUST LAND PROTECTED	OTHER PRESERVE INCREASE	BETTER GRAZING
AJO / WHY			potential				
PUBLIC LANDS							potential

Issues suggested for discussion as part of the Sonoran Desert Conservation Plan

- Are grazing management changes needed to protect watercourses?
- What measures are needed to minimize impacts of recreation?
- Should the current road between Lukeville and I-10 be widened?
- What should be done, if anything, to protect watercourses from mining?

Summary of the species of concern within the watershed, as identified in the Recon reports

Suggested for potential coverage under the multi-species conservation plan:

- Pygmy-owl
- Lesser long nosed bat
- Organ Pipe shovelnosed snake
- Red-backed whiptail lizard
- Acuna cactus
- Tumamoc globeberry

Other species of concern:

- Sonoran pronghorn
- Desert pupfish
- Trelease Agave
- Sonoyta mud turtle
- Ajo rock daisy
- Quitobaquito tryonia (snail)

IV. Ranch Conservation Element

Ranching in Western Pima County

Attachment 3 includes a descriptive summary of Ranching in Western Pima County, drafted by Ms. Linda Mayro, the lead staff of the Ranch Conservation Team. Ranches in the area are described, along with grazing allotments, the carrying capacity per square mile by grazing allotment, the role of stock tanks and other ranch related resource topics.

V. Cultural Resources Element

Attachment 4 is a cultural and historic resources inventory report by Mr. David Cushman, the lead staff of the Cultural and Historic Resources Technical Team. Three kinds of resources are described: archaeological sites, historic resources, and traditional cultural resources, which are all defined and quantified within the report. This document includes maps that depict: the zone of archaeological sites in Western Pima County; general archeological site and survey locations; and archaeological sites in relation to land ownership.

VII. Land Use Considerations

Land Use in Western Pima County

Attachment 5 is the contribution of Mr. Ben Changkakoti of the Planning Division. This report offers information about current and planned land use, zoning, housing types, viewsheds, infrastructure (including roads, access, water, sanitary sewer, natural gas, telephone and electricity), schools, parks, open space, real estate market conditions, capital improvement projects, and permits issued for residential and commercial activities.

VIII. Conclusion

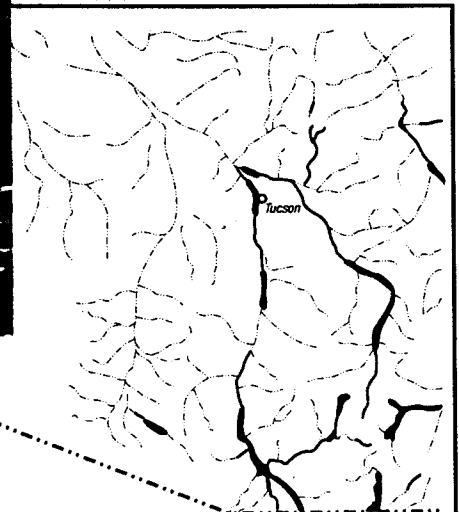
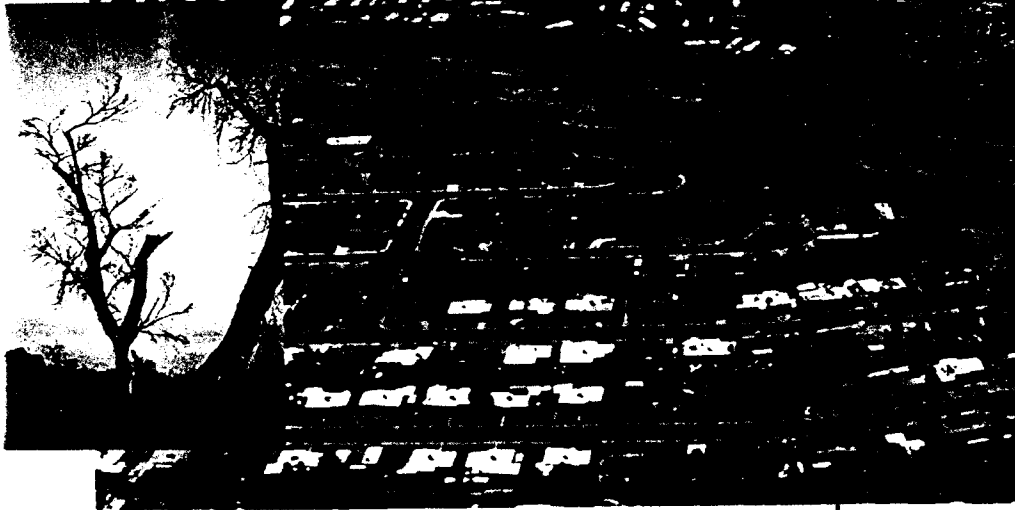
After subarea meetings are held, additional contributions and comments are received, discrepancies are eliminated in the data of individual reports and resource reports are perfected, a synthesizing subarea evaluation will be drafted that includes landowner goals and suggestions for conservation strategies. This initial presentation of resource information is intended to both educate and serve as an invitation to greater participation in crafting the Sonoran Desert Conservation Plan.

Biological Stress Assessment

An Overview Discussion of Issues and Concerns

Sonoran Desert Conservation Plan

March 2000



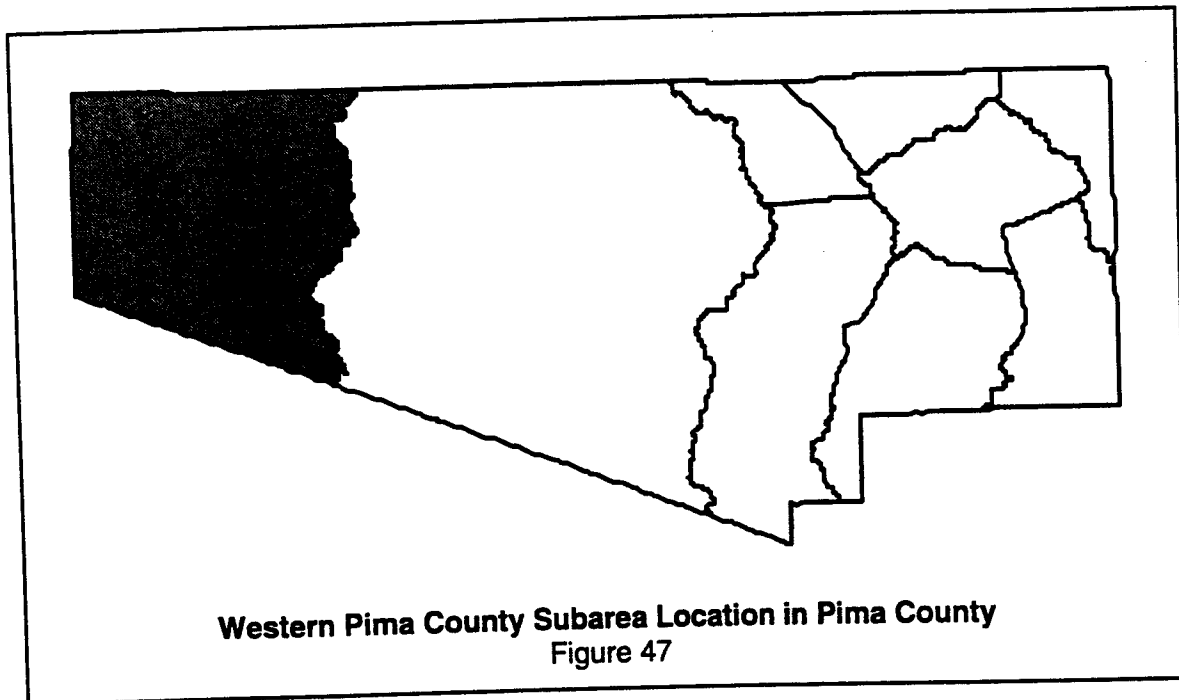
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County Administrator
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XI. Western Pima County (Subarea 8)

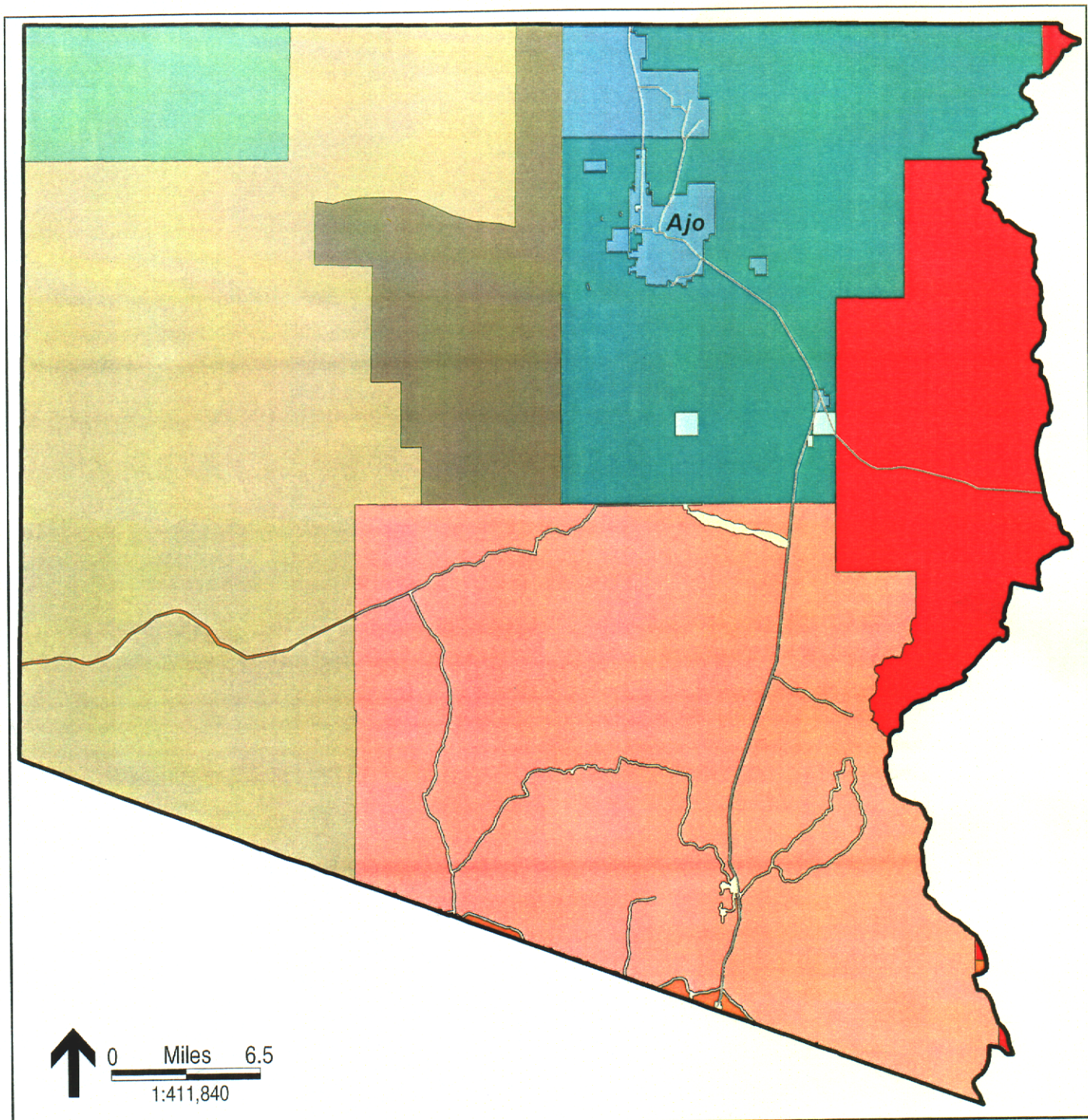
This subarea occupies the western third of Pima County and is comprised of four watersheds: Rio Sonoyta (along the U.S./Mexico border), San Cristobal, Childs Valley (where the community of Ajo is located), and Midway (Figure 47). The uplands and mountainous areas are within the Arizona Upland Subdivision but much of the lower valley areas are within the Lower Colorado Subdivision. A few small areas of Semi-desert grassland also occur. The Lower Colorado River Subdivision is the driest subdivision of the Sonoran desert scrub biotic community. Although plant species are similar to those found in the Arizona Upland subdivision, the higher temperatures and lower precipitation result in more open and simple vegetative growth. Competition between species for scarce water resources is intense. Topographic relief is generally low, and sheet flow is common.



A. Potential Threats and Stressors

1. Land Use and Landscape Character

Private land in the subarea is limited to the communities of Ajo and Why so development is limited and the landscape is characterized by expanses of broad sweeping valleys punctuated by isolated rugged mountains and rock outcrops (Figure 48). Why is located at the western edge of the Tohono O'odham Nation, where SR-86 intersects with SR-85. Here there are a number of RV parks and facilities to serve visitors to Mexico, Organ Pipe Cactus National Monument, and Cabeza Prieta National Wildlife Refuge. The Nation operates a small casino just east of Why.



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Land Ownership and Land Management in the Western Pima County Subarea



Figure 48

Ajo was founded as a mining town in 1855 (Arizona State Museum [ASM] 1999). The Arizona Mining and Trading Company arrived here in 1854, began mining copper and other ores and eventually merged with Phelps Dodge Corporation in 1931. Phelps

Dodge Mining Company (PDMC) operated the large "New Cornelia" open pit mine and smelting operation until depressed copper prices forced a shutdown in 1985 (Ajo 2000). This greatly affected the local economy as the town had always been primarily a "company town" with the mine as its mainstay. In May of 1997 PDMC decided to reopen the mine using more efficient and cost-effective extraction techniques. The operation will consist of a grinding mill and concentrator producing an estimated 135 million pounds of copper per year (Ajo 2000). PDMC plans to reuse the existing pit site, effectively neutralizing the hydrological and aesthetic objectives common to most mining proposals. The promised 600 mining jobs will boost employment to the community of Ajo by 30 percent (*Arizona Daily Star* 1997).

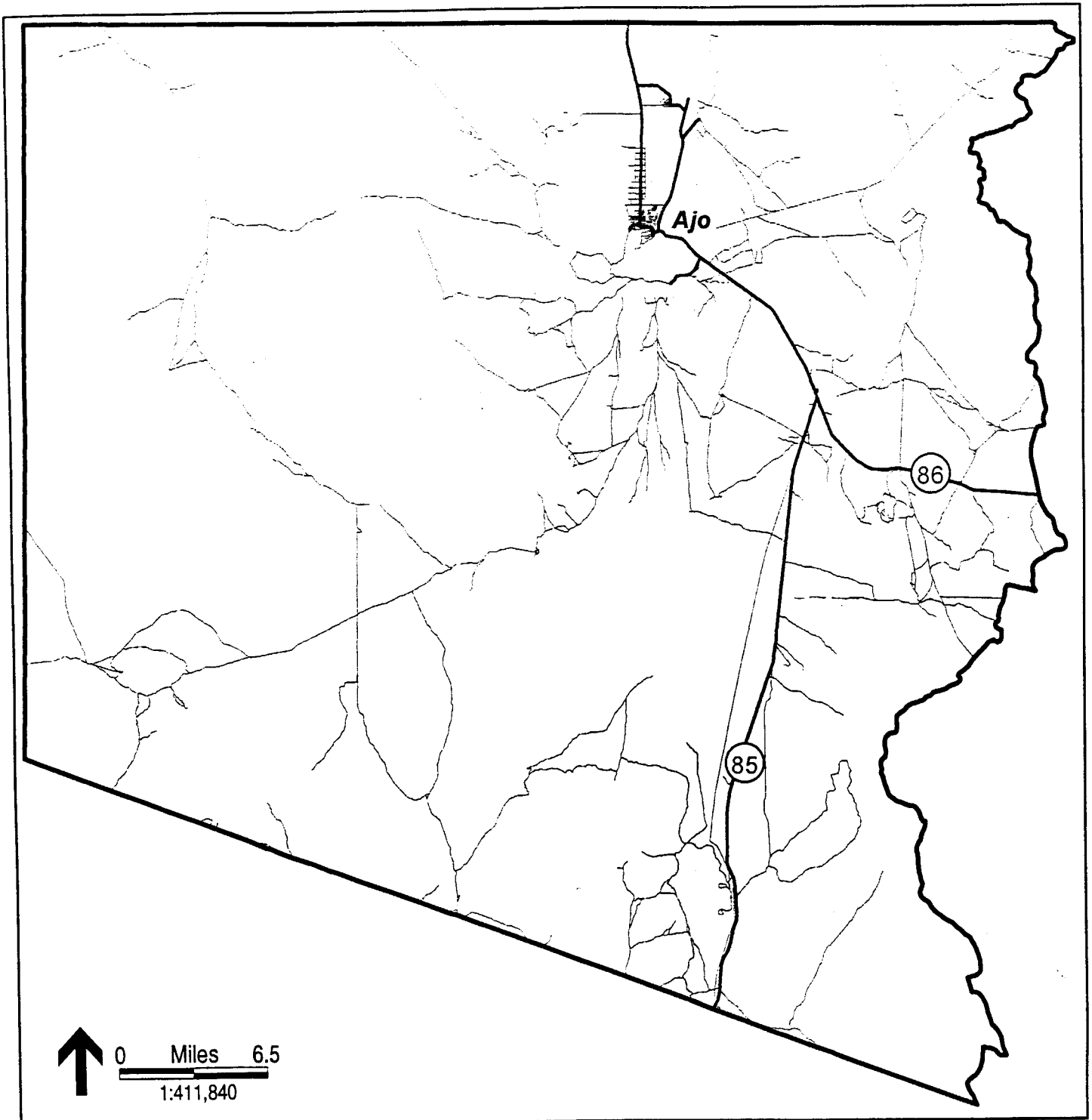
The potential for increased smaller scale mining activities exists in the BLM lands that surround Ajo. Biological stressors associated with increased mining include habitat loss, degradation, and fragmentation. These would be of particular concern to the managers of Cabeza Prieta National Wildlife Refuge (west of Ajo) and Organ Pipe Cactus National Monument. The PDMC mining activities could be reactivated to levels that might be of concern with respect to air and water pollution and atmospheric deposition. These are issues PDMC will need to resolve as part of their permitting process.

Ajo, like Why, also serves as a "jumping off" point for travelers to and from Mexico, recreationists and visitors to the region. When the mine closed the economic base shifted to tourism and there has been an increase in the number of RV parks and support facilities. Homes once owned by PDMC have been sold to new residents, mostly retirees. In 1992 homes sales to retirees constituted 99 percent of the available housing (USDI-USFWS 1998). The potential stress to biological resources that would be associated with the increasing urbanization of the Ajo area is somewhat limited due to the small amount of private property that exists. However, the secondary impacts of increased recreational use of adjacent areas and increased groundwater pumping are distinct sources of stress. BLM lands near Ajo allow for long-term camping. RV use in these areas is very high in the cooler months. This has resulted in moderate to severe habitat loss, alteration and degradation in an area that is habitat for Sonoran pronghorn and other wildlife. Often times vegetation is damaged or cut down, soils are compacted, sewage is disposed of and areas are left with little or no vegetative cover (USDI-NPS Rutman 2000.)

Livestock grazing is an allowed use in the BLM lands surrounding Ajo. Because sources of water are few and forage is very limited in this area, grazing can quickly degrade habitat, particularly in the vicinity of the water sources. Grazing is not permitted in Cabeza Prieta National Wildlife Refuge, Organ Pipe Cactus National Monument, or the Barry M. Goldwater Air Force Range.

2. Transportation

Arizona State Routes 86 and 85 are the primary roadways in the area (Figure 49). SR-85 extends south from SR-86 at Why to the border crossing at Lukeville, and north from Ajo to Interstate 8. Numerous other small roadways, many unpaved, exist throughout Ajo



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Road Network in the Western Pima County Subarea



-  Highway or Major Road
-  Local Road

Figure 49

and the BLM lands that surround it. The Ajo Municipal Airport is located approximately 10 miles north of Ajo. It accommodates only small aircraft.

The international port-of-entry at Lukeville provides vehicular access between 6:00 A.M. until midnight each day. Most of the traffic is not attributed to monument visitors. Increased traffic along SR-85 is due to increased regional tourism and increased truck traffic resulting from NAFTA. The NPS and ADOT are working together to develop three interpretative pullouts along SR-85 through the Monument. Because the speed limit is 65 miles per hour, deceleration and acceleration lanes will be required for each pullout. Drainage improvements such as extended culverts and/or bridges will be required at wash crossings. This will result in habitat loss and fragmentation of habitat that support Sonoran pronghorn, CFPO, and lesser long-nosed bats. It will also make the roadway more of a barrier to wildlife movement (USDI-NPS Rutman 2000).

Other roadways in the subarea are found in the Cabeza Prieta National Wildlife Refuge and Organ Pipe Cactus National Monument. The two loop roads in the Monument are both unpaved. Several other unimproved dirt roads go further into the Monument backcountry. A Border Patrol road is located just north of the U.S./Mexico border; Mexico Highway 2 is located just south of the border, west of SR-85. There are also numerous other wildcat roads and trails in the area that have been created by UDAs and other persons. The traffic into the U.S. from Mexico has become a real problem. Vehicles as well as stock (burros, horses, and mules) cut fences and make their own paths bringing in drugs and UDAs. Resource damage includes habitat loss and degradation, disturbance of wildlife, increased potential for wildfires, and introduction of non-native species. Huge amounts of trash is left behind (USDI-NPS-Rutman 2000). Because the Monument is bisected by SR-85, concerns have been raised about how SR-85 serves as a barrier to wildlife movement, particularly the endangered Sonoran pronghorn, associated roadkill, and the potential for introduction and spread of invasive species (USDI-NPS 1997). NPS staff is working with ADOT, AG&FD, USFWS, and others to study the extent of traffic impacts on wildlife and measures to reduce negative impacts.

Roads within Cabeza Prieta are unpaved, unmaintained, and passable by four-wheel-drive vehicles by permit only. A 200-foot-wide corridor along the roads defines the non-wilderness area associated with the roads. There are no restrictions on where visitors may hike or camp with one exception: no camping is allowed within one-quarter mile of water developments. The management plan calls for the closure of approximately 30 miles of administrative trails and 139 miles of old trails (USDI-USFWS 1998).

3. Military Overflights and Activities at Cabeza Prieta National Wildlife Refuge

Airspace over 822,000 of the refuge's 860,010 acres is part of the Barry M. Goldwater Air Force Range (BMGR) (land area of which is located to the north of the refuge). Military flights are allowed at elevations of 1,500 feet and higher above ground level throughout the refuge (USDI-USFWS 1998). Although use of live fire is allowed, it is confined to air-to-air weaponry and is confined to altitudes of 5,000 feet. There are defined flight corridors that allow flights as low as 200 feet above ground level. A proposal to increase low-level flights over the Refuge is currently being reviewed. The USFWS determined that the proposal could cause harm to the endangered Sonoran pronghorn (Stand by Your Lands 2000).

Low-level overflights are also a concern within Organ Pipe Cactus National Monument, particularly in Sonoran pronghorn habitat areas where noise and wildlife disturbance are a source of stress. Helicopter overflights by Border Patrol and Customs agents are an additional source of noise and disturbance along the border (USDI-NPS-Rutman 2000).

Potential sources of biological stress associated with military activities include visual and noise disturbance, disturbance to wildlife behavior, wildlife shifting use areas due to military activities, aircraft collisions with wildlife, and impacts caused by live fire and military debris including live ordnance. A monitoring program has been established to study detectable wildlife population impacts at the conducted flight levels. The refuge manager has been working with the Air Force to remove large military debris from wilderness areas.

Since 1995 the Air Force demolished a radar surveillance station located at Childs Mountain, northwest of Ajo. A concrete structure and several towers remain. An upgraded FAA radar facility is planned for this location to serve multi-agency purposes. The USFWS is working towards an alternative that ensures compatibility with refuge purposes, possibly including a wildlife overlook interpretive site. The long-term strategy is to trade the land for other lands that would be better managed for wildlife purposes. A winding road leads to this area from SR-85.

4. Water Use

Water is a limited resource in this subarea (Table 28). Groundwater is the source of water for the New Cornelia mine and for the community of Ajo. There are four water companies and a community wastewater treatment facility (Tellman 2000). The wastewater facility is privately operated by a subsidiary of PDMC. It does not meet Pima County standards (Pima County-Wastewater 2000). Groundwater pumping will increase in the future in order to accommodate the mine operations and domestic water supplies for an influx of residents. If it increases to the extent of lowering groundwater levels it could negatively affect vegetative resources which are adapted to survive with the 9-inch or less of rainfall the area receives per year.

Within the Cabeza Prieta National Wildlife Refuge no perennial water bodies exist and surface water is scarce, varying with the seasons. There are 22 developed waters on the refuge. At certain times and locations water is hauled by truck to supplemental wildlife "drinkers." One research priority of the Refuge is to analyze the role of developed waters and how they affect desert bighorn sheep, Sonoran pronghorn, and other wildlife populations including predators and invasive species. Within the Pima County portion of the Refuge an area of shallow groundwater exists in the valley east of the Growler Mountains (west of Ajo). A few wells operated by windmills are located here. Other wells are located elsewhere within the refuge (USDI-USFWS 1998). The depth to groundwater could be affected if groundwater pumping continues to increase at Ajo and the New Cornelia mine.

Organ Pipe Cactus National Monument relies on several wells to supply water for staff, visitors, and campers. There are 11 springs, eight of which are located at the Quitobaquito area along the southwest boundary. A pond and dam were built at Quitobaquito in 1860 and an area of lush riparian vegetation surrounds it. It is the largest source of surface water in the monument and one of the largest oases in the Sonoran

TABLE 28
STREAM CHARACTERISTICS OF THE WESTERN PIMA COUNTY SUBAREA

Stream Name	Miles of		Acres of Hydro- mesoriparian Habitat	Acres of Class A		Acres of Shallow Groundwater	Pygmy- Owl Habitat	Fish Species	Leopard Frogs
	Perennial Flow	Intermittent Flow		Riparian Habitat	Habitat				
Quitobaquito Pond	0.1	0	N/A	N/A	N/A	No	1	N/A	
Quitobaquito Springs	0.1	0	N/A	N/A	N/A	No	N/A	N/A	

N/A = not applicable.

Desert. Endangered desert pupfish are found here. Introduction of non-native fish has been a concern that Monument staff hope to mitigate with increased patrol time (USDI-USFWS 1998).

Increasing urban and agricultural needs for water in the Sonoyta Valley of Mexico have raised concerns regarding the water table. A moratorium on new well drilling has been imposed but the aquifer continues to be lowered by the current rate of use. The Monument staff continues to work with resource personnel in Mexico regarding this issue (USDI-USFWS 1998). If surface waters at the Quitobaquito area are reduced as a result of this overdraft it would directly affect the habitat of the desert pupfish population here, as well as the surrounding riparian woodland habitat.

5. Recreation

Recreational opportunities in the Western Pima County Subarea are found in the Organ Pipe Cactus National Monument and Cabeza Prieta National Wildlife Refuge. Visitor use to both areas continues to increase. The Monument has developed trails and a campground, with plans for expansion and addition of new camping spaces. Recreational use of the Refuge is much more primitive and allowed by permit only. Hunting of bighorn sheep is allowed within the Refuge.

Because of the few trails within the Monument many miles of "social" trails have appeared. These serve to degrade and fragment habitat. Uncontrolled use of trails into the Quitobaquito area is being curtailed. Visitors have facilitated the spread of invasive species here and Monument staff perform weekly inspections of the area, looking for nonnative species.

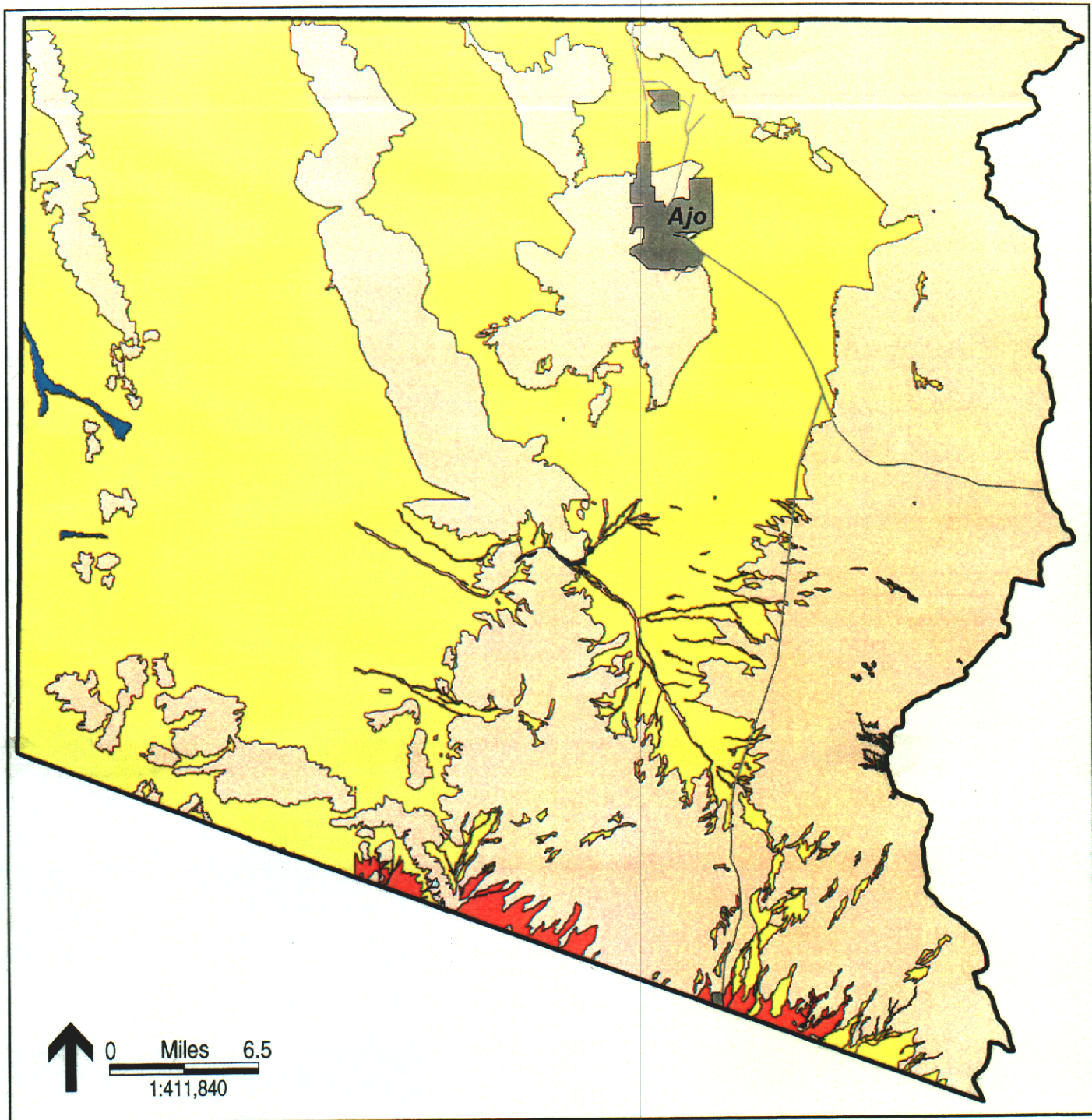
While the NPS is not proposing to expand visitation to the Monument, it anticipates that visitation will continue to increase. Some expansion of existing use areas is planned. Actions at the Monument that could further increase visitation include expanded visitor services, increased number of trails, and increased campsites at Alamo Canyon and Twin Peaks.

The expansion of the campground at Alamo Canyon will be evaluated by Monument staff with regard to the mine adit at Copper Mountain that exists nearby. The adit and surrounding foraging habitat are home to the largest known maternity colony of the lesser long-nosed bat in the U.S. The adit are inspected every two weeks from April through September. The mine adit is closed to all visitor use and human visitation in the area does not appear to be impacting the bats. Removal of columnar cacti resulting from adding new campsites would be a potential source of stress to the bat colony (USDI-NPS-Rutman 2000).

B. Biological Resources

1. Vegetation and Land Cover






Habitat within the Western Pima County Subarea consists primarily of creosote-bursage and palo verde-mixed cacti communities (Figure 50). Areas of saltbrush occupy the southern edge of the subarea and near these is a small stand of cattail. Urban development has occurred on the southern edge and the central portion of the subarea.







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Vegetation and Land Cover in the Western Pima County Subarea

Vegetation Communities (BLP Classification)

	122.41 Pinyon-Juniper
	123.31 Encinal (Oak)
	124.71 Mesquite
	133.36 Mixed-Evergreen Sclerophyll
	154.11 Creosote-Bursage

	154.12 Paloverde-Mixed Cacti
	154.17 Saltbush
	244.71 Cattail
	244.75 Saltgrass

Other Land Cover Types







	999.0 Unclassified
	999.1 Agriculture
	999.2 Urban
	999.3 Water
	999.4 Bare Ground
	Major Road or Highway

Figure 50

Small areas of pinyon-juniper are located on the eastern edge of the subarea and small stands of mesquite grow in centrally located drainages. Permanent water is located in two places on the western edge of the subarea and these may support riparian vegetation.

2. Critical Habitat

Although the CFPO is known to occur in the subarea, no areas of Critical Habitat have been designated.

3. Incidental Take Permit

The USFWS Biological Opinion on the management plan for Organ Pipe Cactus National Monument identified areas of Incidental Take for the lesser long-nosed bat, the Sonoran pronghorn and CFPO. Take is expected to occur if unauthorized human disturbance of the bat roost occurs or if one or more Sonoran pronghorn is injured or killed as a result of traffic on SR-85. USFWS anticipates 15 instances of incidental take of CFPO through harassment of individuals nesting or foraging in the area. The USFWS determined that levels of anticipated Take are not likely to result in jeopardy to the species (a "no jeopardy" opinion.)

4. Species at Risk

A total of 12 Status 1 and 2 Vulnerable Species occur within the subarea (Table 29).

C. Existing and Proposed Preserves

Organ Pipe Cactus National Monument, Cabeza Prieta National Wildlife Refuge, and the BMGR, as described above are the preserves within the Subarea. The Air Force has primary jurisdiction over the land of the BMGR. Although the BMGR is excluded from this study, the appropriateness of the Department of Defense managing land that functions as a wildlife refuge has been hotly debated. The USFWS and many conservation groups have voiced concern about the impact of Air Force training activities within the BMGR and the Refuge on endangered Sonoran pronghorn, bighorn sheep, other wildlife and plant communities (Stand 2000).

Organ Pipe Cactus National Monument has been included in an area designated by UNESCO as a Biosphere. This places a greater emphasis on the protection and study of biological and other resources.

Recent efforts by a citizen group have suggested that the Monument, the Wildlife Refuge, and portions of the BMGR be combined into a National Park. The Sonoran Desert National Park would be under the management of the NPS. Under this proposal, the Air Force would continue training activities at BMGR, but the land would be managed by NPS (*Arizona Daily Star* 1999).

D. Summary of Potential Stressors to Biological Resources

Primary stressors to biological resources within the Western Pima County Subarea include habitat alteration and degradation, habitat fragmentation, human use and

TABLE 29
STATUS 1 AND 2 VULNERABLE SPECIES OCCURRING IN THE WESTERN PIMA COUNTY SUBAREA

Scientific Name/Common Name	Pima County Status	State Rank	Listing Status	Potential Threats and Stressors	HDMS Records	Notes
<i>Agave schottii</i> var. <i>treleasei</i> Trelease Agave	1	S1	FSC FSS HS	Narrow endemic. Direct impacts by road or recreational facility construction may impact local populations.	Mount Ajo quad 1989 NPS.	Occurs in an isolated, relatively secure location in Organ Pipe Cactus National Monument.
<i>Antilocapra americana sonoriensis</i> Sonoran Pronghorn	1	S1	LE WSC	Loss of habitat (historic); drought; drying of major rivers; historic overgrazing. Population has not recovered, despite three large public land withdrawals, and the removal of cattle. 1980's (AGFD 1986). In Mexico, it is believed that economic exploitation of habitat (grazing and agriculture) and poaching are still causing population and habitat losses. Military activities have been alleged to be a threat in a current lawsuit. Border patrol and illegal alien and smuggling activities may also be a threat. Present knowledge presents no clear means to increase either population densities or range	Growler Peak quad 1968-1980 FWS Granite Mountains South quad 1968-1980 FWS Chico Shunie quad 1994 BLM Agua Dulce Mountains quad 1991 FWS West of Lukeville quad 1980 NPS Diaz Peak quad 1980 NPS	Cabeza Prieta National Wildlife Refuge, Organ Pipe Cactus National Monument, Luke Air Force Barry M. Goldwater Guntery Range, and possibly Tohono O'odham Indian Reservation. In Mexico: northwest part of the state of Sonora
<i>Chionactis palorostriis organica</i> Organ pipe shovel-nosed snake	1	S2	FSS	Drought. Grazing, arroyo cutting. Collecting. Road kill.	Ajo South quad 2 sites 1945, 1950 BLM Armenta Well quad 4 sites 1993-1994 NPS, BLM	Most, if not all, of the range of this species is within Organ Pipe Cactus National Monument.

TABLE 29
 STATUS 1 AND 2 VULNERABLE SPECIES OCCURRING IN IN THE WESTERN PIMA COUNTY SUBAREA
 (continued)

Scientific Name/Common Name	Pima County Status	State Rank	Listing Status	Potential Threats and Stressors	HDMS Records	Notes
<i>Cnemidophorus burti xanthonotus</i> Red-backed whiptail lizard	1		FSC	Limited distribution. Climate change?	Tillotson Peak quad 5 sites 1993 NPS Mount Ajo quad 1971 NPS Lukeville quad 3 sites, 1 1956 Private, 2 1977, 1996 NPS	
<i>Cyprinodon macularius eremus</i> Quitobaquito desert pupfish	1	S1	LE WSC	Narrow endemic. All in one pond, which is not in pristine condition. Non-native predators, parasites, diseases. Lowered groundwater resulting from pumping in Mexico. Illegal activities, e.g. dumping a load of illicit drugs to evade arrest, could harm the environment.	Quitobaquito Springs quad 1995 NPS Mount Ajo quad 2 sites 1939, 1968 NPS	There are at least two artificially maintained refugia populations. Six reintroduction sites were tried, 5 in Organ Pipe Cactus NM, 1 in Salt River near Tempe. All have failed.
<i>Echinomastus erectocentrus</i> var. <i>acunensis</i> Acuña cactus	1	S1	FC HS	Limited range, requirements not clearly understood. Poaching and military activity may affect this	West of Lukeville quad 1952 NPS Tillotson Peak quad 1980	May be more common and widespread than is currently known—very difficult to find.

TABLE 29
 STATUS 1 AND 2 VULNERABLE SPECIES OCCURRING IN IN THE WESTERN PIMA COUNTY SUBAREA
 (continued)

Scientific Name/Common Name	Pima County Status	State Rank	Listing Status	Potential Threats and Stressors	HDMS Records	Notes
<i>Glaucidium brasilianum cactorum</i> Cactus ferruginous pygmy-owl	1	S1	FE FSS WSC	Habitat destruction and alteration, historic and present. Groundwater pumping, channelization, urbanization, historic livestock grazing? Farming and agricultural uses? Wood cutting. Disturbance by bird watchers. Small population subject to stochastic events. Possibility of disease, including emerging diseases, and loss of viable food supply as a result of drought and/or climate change.	NPS Kino Peak quad 1955 NPS Coffeepot Mountain quad 1982 BLM Bates Well quad 1998 NPS Armenta Well quad 1999 NPS Gunsight quad 1999 2 sites NPS Kino Peak quad 1972 NPS Mount Ajo quad 1992, 1995, 1996 NPS Lukeville quad 1981, 1996 (2), 1997 NPS Diaz Peak quad 1996 NPS	Subarea is not included in Critical Habitat. This species has been known to be present in Organ Pipe Cactus NM since 1948, but is not in the same places every year.
<i>Kinostemon sonoriense longifemorale</i> Sonoyta mud turtle	1	S1	FC FSS	Very limited range. Possible groundwater pumping in Mexico. Water quality. Poor recruitment. Collecting. Disease, malnutrition? Competition with pupfish (<i>Cyprinodon</i>)	Quitobaquito Springs quad Quitobaquito pond 1993 NPS	This is the only known location for this subspecies.

TABLE 29
STATUS 1 AND 2 VULNERABLE SPECIES OCCURRING IN IN THE WESTERN PIMA COUNTY SUBAREA
 (continued)

Scientific Name/Common Name	Pima County Status	State Rank	Listing Status	Potential Threats and Stressors	HDMS Records	Notes
<i>Perityle ajoensis</i> Ajo rock daisy	1	S1	SR	<p><i>macularis eremicus?</i> (Phil Rosen, personal communication, 03-04-99).</p> <p>Limited range. Little knowledge. Recently described species.</p>	Mount Ajo quad 3 sites 1972, 1988 (2) all NPS	The only known locations are in Organ Pipe Cactus NM, in the Ajo Mountains, in rocky canyons.
<i>Tryonia quitobaquitae</i> Quitobaquito tryonia (snail)	1	S1	WSC FSS?	Very limited range. Possible habitat loss by groundwater pumping in Mexico. Water quality.	Wutiobaquito Springs quad, two springs 1985, 1995 NPS	
<i>Leptonycteris curasoae verbabuena</i> Lesser long-nosed bat	2	S2	FE WSC	<p>Alleged to be related to reduction of numbers of maternity colonies and decline in size of remaining maternity colonies in Arizona and Sonora due to exclusion and disturbance.</p> <p>Additionally, thought to be negatively affected by large reductions in acreage of native agaves over large areas of northern Mexico due to excessive harvesting for local manufacture of mescal and tequila.</p> <p>Excessive browsing by livestock on newly emergent flower stalks of <i>Agaves</i> has also been suggested as</p>	<p>Bates Well quad 2 sites 1989, 1992 NPS</p> <p>O'Neill Hills quad 1989 FWS</p> <p>Agua Dulce Mountains quad 1968-1989 FWS</p> <p>Pozo Nuevo Well quad 1979 NPS</p> <p>Kino Peak quad 1979 NPS</p> <p>Tillotson Peak quad 1989 NPS</p> <p>Mounta Ajo quad</p>	A major maternity roost of thousands of bats is in Organ Pipe Cactus NM and has been studied for many years.

TABLE 29
STATUS 1 AND 2 VULNERABLE SPECIES OCCURRING IN IN THE WESTERN PIMA COUNTY SUBAREA
 (continued)

Scientific Name/Common Name	Pima County Status	State Rank	Listing Status	Potential Threats and Stressors	HDMS Records	Notes
<i>Tumamoca macdougalli</i> Tumamoc globeberry	2	S3	FSS SR	possibly decreasing foraging opportunities and thus contributing to declines among these bats. Threats include urbanization, farming, overgrazing, recreation, habitat conversion, javelina (eating tubers), off-road vehicle use, pesticides.	1979, 1982 NPS Kino Peak quad 1951 NPS	

NOTE: Most of the records from this subarea are from Organ Pipe Cactus National Monument and the Cabeza Prieta National Wildlife Refuge. Some species on the category 1 and 2 list are present in this area, but there are no HDMS records for them. For example, Bell's Vireo, and Townsend' big-eared bat (only 3 records in years of surveys), Merriam's mouse (1 record in many years of surveys).

Quads: Agulla Mtns. SE, Okie Well, East Pass, Midway SW, Deadman Gap, Hat Mountain SW, Tom Thumb, Granite Mts. North, West of Growler Peak, Growler Peak, Childs Mtn., Ajo North, Burro Gap, Coffeepot Mtn., Granite Mts. South, Saguaro Gap Well, Temporal Pass, Chico Shunie, Ajo South, Sikort Chuapo, Gakolik Mtns., Antelope Hills, North of Agua Dulce Mts., Palo Verde Camp, Bates Well, Armenta Well, Gunsight, Hotason Vo, O'Neill Hills, Agua Dulce Mts., Pozo Nuevo Well, Kino Peak, Tillotson Peak, Mount Ajo, Gu Vo, West of Quitobaquito Springs, Quitobaquito Springs, West of Lukeville, Lukeville, Diaz Peak, Pia Oik, South of Lukeville, Blankenship Well, Menagers Lake.

overuse, decline in groundwater levels, and competition and predation by invasive species. The current ownership and management pattern within the Western Pima County Subarea is primarily conservation status 1a and 1b, with most of the remainder in status 3b (Figure 51), limited areas of intensive uses occur, primarily associated with Ajo and Why.

Activities contributing to biological stress are summarized in Table 30. These can be mostly attributed to the effects of a history of large and small-scale mining in the area, livestock grazing in a very arid region, increasing tourism and recreational use of the preserves and groundwater pumping to support agricultural uses directly south in Mexico.

The population of Ajo will increase somewhat in response to the New Cornelia mine reopening and an influx of jobs and residents. Increasing tourism and the appeal of the area to retirees is also bringing new people into the area. The primary consequence of this will be an increase in groundwater pumping.

Continued, increased, or intensified military training activities in the BMGR and Cabeza Prieta Wildlife Refuge raise concerns for plant and wildlife species there, particularly the Sonoran pronghorn and bighorn sheep.

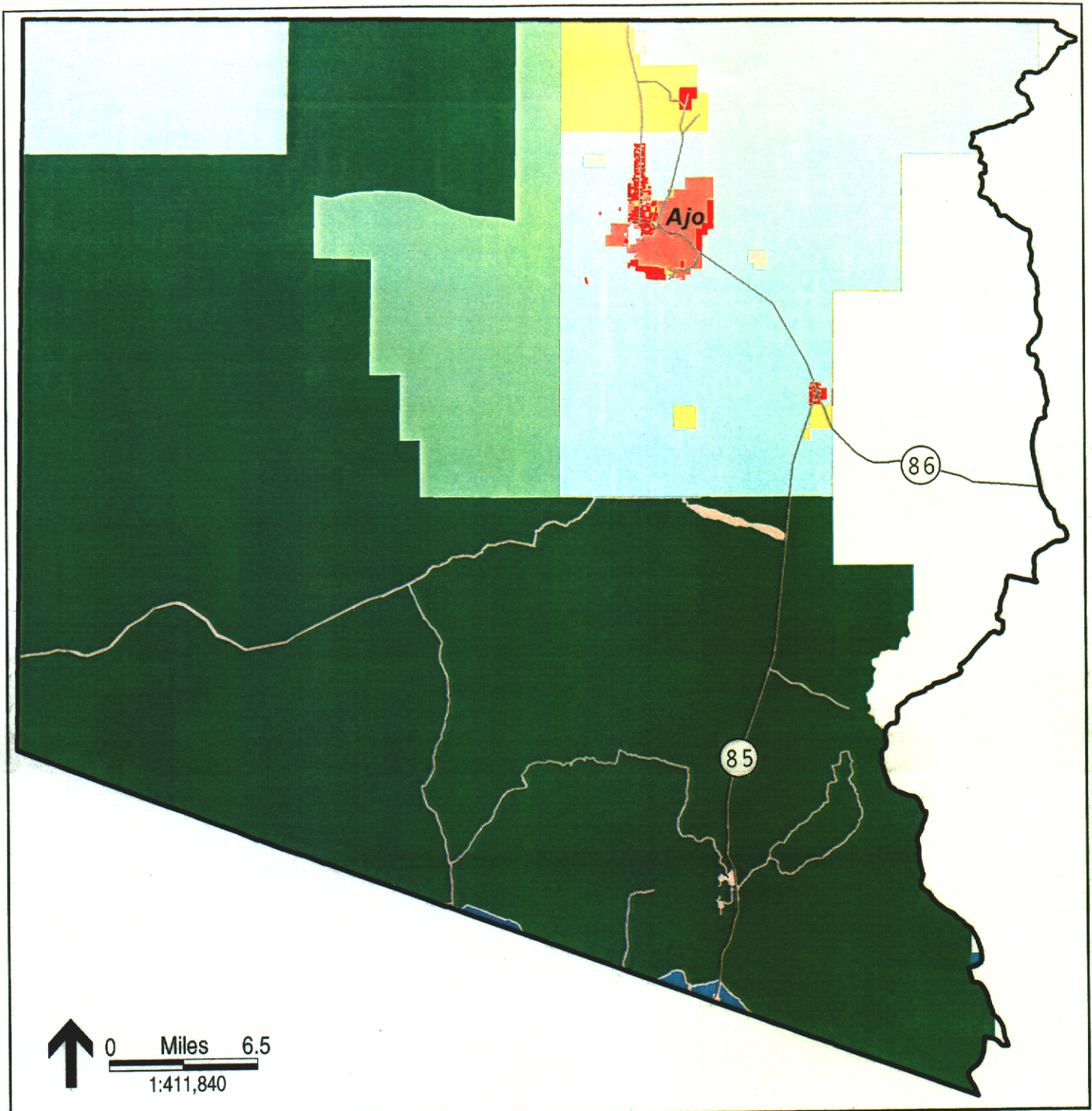
Expansion of the campground at Alamo Canyon Campground and increased use of trails in the vicinity are potential source of stress to the population of lesser long-nosed bats and desert pupfish. Precautions are being taken by the NPS to avoid impacting these species. Trapping by non-native fish will continue as an ongoing effort. Access to the bats' roost adit is restricted and the adit is carefully monitored for indication of human disturbance or presence of predatory barn owls.

Potential exists for the transfer of land from public (BLM) to private ownership, and the expansion of the Ajo community. The subsequent conversion of native vegetated lands, albeit grazed, to higher intensity urbanized areas dependent upon groundwater pumping raises concern for groundwater availability. This is a particular concern where these public lands are located adjacent to the existing preserves. The high impact of dispersed and long-term camping on BLM lands is a stressor to vegetation and wildlife in the area around Ajo.

The reopening of the New Cornelia mine is not expected to impact land areas not already disturbed. However, increased groundwater pumping, water pollution, and atmospheric deposition are concerns that Phelps Dodge will have to address as part of their permitting process.

The potential for increased smaller-scale mining exists. The BLM land surrounding Ajo permits mining. Increased mining in this area would result in habitat loss, alteration, degradation, and fragmentation.

One subarea habitat that appears to be most vulnerable to stress is the small riparian and wetland area surrounding the Quitobaquito spring and pond. Although NPS is taking precautions to protect and minimize visitor impacts to the area, increasing groundwater pumping and declining groundwater levels in the agricultural areas to the south in Mexico could affect the available surface water here. This is a potential stressor to the



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Level of Threat Represented by Conservation Status in the Western Pima County Subarea

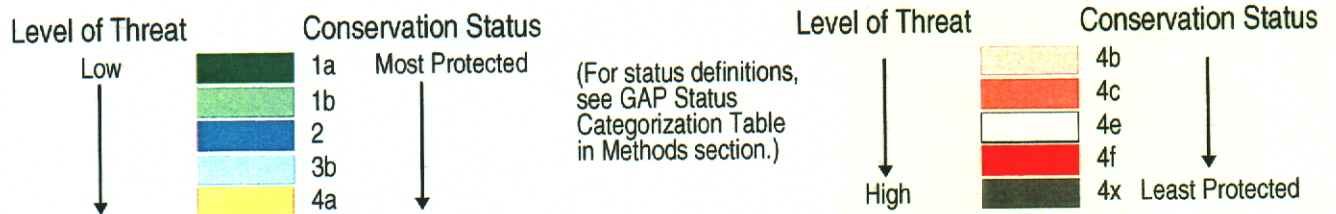


Figure 51

TABLE 30
LAND USE ACTIVITIES WITHIN LAND OWNERSHIP/MANAGEMENT CATEGORIES
OF THE WESTERN PIMA COUNTY SUBAREA

Ownership or Management Category	Land Uses and Activities									
	Conversion of Vegetative Cover	Competition/Predation by Invasive Species	Lot-Splitting & Urbanization	Groundwater Pumping	Water Diversion & Impoundments	Recreational Uses	Mining	Roadways	Livestock Grazing	Removal of Plants
Cabeza Prieta Wildlife Refuge (76,990 acres)	-	x	-	x	x	x	⊕	x	⊕	⊕
Cabeza Prieta Roads (1,231 acres)										
Cabeza Prieta Wilderness (322,145 acres)										
Organ Pipe National Monument (1,628 acres)	-	x	-	x	*	x	⊕	x	⊕	⊕
Organ Pipe NM Roads (10,451 acres)										
Organ Pipe NM Wilderness (316,789 acres)										
BLM Lands (174,813 acres)	x	x	*	x	x	x	x	x	x	x
Tohono O'Odham Nation Unreserved (104,959 acres)										
DOD Barry M. Goldwater Range (44,258 acres)										
State Land (1,396 acres)	x	x	*	x	x	x	x	x	x	x
Private Lands (27,472 acres)	x	x	x	x	x	x	x	x	x	x

x = occurs
 - = does not occur
 * = potential to occur
 ⊕ = historic but not present occurrence

endangered pupfish. Primary sources of stress affecting habitats all along the border include the illegal traffic from Mexico, introduction and spread of invasive species such as buffel grass, fountain grass, and red brome, and the illegal collection of desert plants. Invasive grasses have changed the fire regime. Lower elevation plant communities of legumes and cacti are not resistant to the higher temperatures of grass fires and are damaged or killed by wildfires.

An Overview of Pima County's Watersheds and Watercourses

**Pima County
Sonoran Desert Conservation Plan Report**

April 2000

**Barbara Tellman, Water Resources Research Center, University of Arizona
Clint Glass, CMG Drainage Engineering
John Wallace, J.E. Fuller, Consultants**

Chapter 11

Subarea 8 - Western Pima County

WATERSHED/WATERCOURSE CHARACTERISTICS

THE WATERSHED

The area consists of low lying southeast to northwest trending mountain ranges with wide alluvial valleys in between. Few of the mountains in the area rise to more than 3,000 feet in elevation and most of the valley areas lie at or below 1,000 feet in elevation. The most notable mountain ranges in the area are the Ajo Mountains located in the Organ Pipe Cactus National Monument, and the Growler and Granite Mountain ranges, between which lies the Growler Valley and the Growler Wash. The subarea is shown on Fig. 11-1 and the watershed on Fig. 11-2.

The Town of Ajo is located along a saddle in a smaller mountain range known as the Little Ajo Mountains. The town is located on high ground relative to the valley drainage in the area. Only one wash of notable size, the Gibson Arroyo, passes through the existing town site. The Gibson Arroyo is a sand bed channel typical of many in the area. However, the arroyo has been modified and rerouted in places to accommodate development of the town. The reaches of Gibson Arroyo upstream (south and east) of Ajo through Township 12 South, Range 5 West contain broad areas of distributary sheet flow. The washes associates with this distributary flow area spread across the valley floor to widths ranging between one to 3 miles. This area provides a significant amount of overbank storage which reduces downstream peak flow rates and sediment transport volume. Pima County designated Gibson Arroyo in the Ajo area as a critical basin because of drainage problems in the Homer Brown Subdivision.

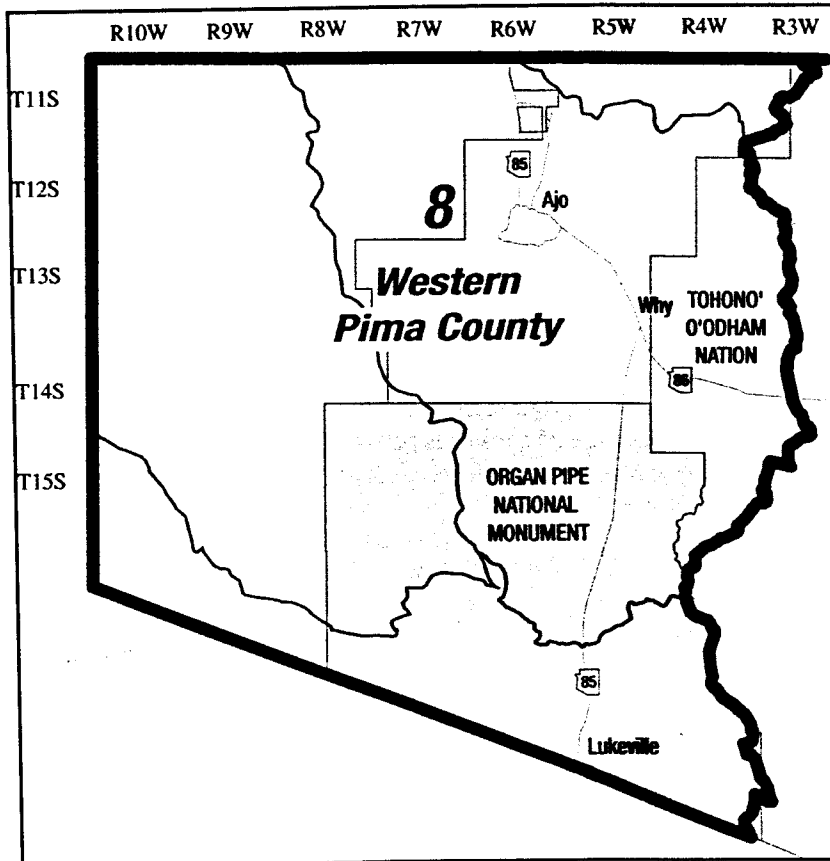


Fig. 11-1. The Western Pima County Subarea.

The area is notable for its relatively low rainfall, which measures about nine inches per year in Ajo. The low density of vegetation of most of the landscape reflects the lower rainfall. The Growler Wash through the Growler Valley, located within the Cabeza Prieta National Wildlife Refuge is one of the larger drainages within the area. However, the lack of vegetation along this wash is remarkable given the size of the upstream watershed.

HUMAN IMPACTS ON THE WATERCOURSES

TRANSPORTATION

The main road through this area is Highway 85 which connects with Mexican Highway 8 which goes to Rocky Point and with Mexican Highway 2, the major east-west Mexican highway in the area. Highway 85 goes from the border town of Lukeville to Interstate 8 at Gila Bend and Interstate 10 Buckeye. It also connects to Highway 86 which goes through the Tohono O'odham Nation to Tucson. Most of the watercourse crossings are dip crossings, with some bridges and culverts. There is a small airport in Ajo.

WATER AND WASTEWATER-RELATED LAND USES

Water Supply

Water is supplied from private wells and from a private water company in Ajo. ASARCO has its own wells and Organ Pipe National Monument has its own wells and water system for visitors.

Wastewater

Ajo's wastewater is treated in a private facility. A proposal is pending to expand the size of this facility. Organ Pipe National Monument has its own treatment facility. The rest of the region is on septic systems.

EXISTING PUBLIC LAND USES

The Western Pima County Subarea is a vast area consisting primarily of public lands. Organ Pipe Cactus National Monument occupies 320,800 acres at the southeast portion of this subarea. A large campground, capable of handling large RVs, is situated near the Visitor Center. Informal camping is allowed elsewhere in the Monument. Two scenic drives allow the visitor access to trails and picnic areas. The eastern drive is paved, while the western one is unpaved. Both routes follow land contours and depend on dip crossings to traverse the many small watercourses.

The Cabeza Prieta National Wildlife Refuge occupies 860,010 acres in Pima and Yuma Counties, with 429,750 of those acres in Pima County. This area is only accessible to 4-wheel vehicles by permit. The road is unpaved and often unpassable during downpours. Use during wet periods can seriously degrade the road through creation of ruts.

The 2,700,000 acre Goldwater Air Force Gunnery Range (44,279 acres in Pima County) extends partially into Pima County, but is mostly in Yuma and Maricopa Counties. Most of this area is closed to the public and used primarily for military training activities. Parts are accessible by permit and are used to access the Yuma County parts of the Wildlife Refuge. Military use of the area is periodically reviewed and is not authorized indefinitely. Grazing is not allowed in the Monument, Refuge, or Gunnery Range, although some cattle do reach the range across the international border.

To the east of this subarea is the 2,490,105 acre Tohono O'odham Nation. The remaining lands between the above public areas are held by the Bureau of Land Management where grazing is allowed. The sources of water and forage are very limited in this dry portion of the state and grazing tends to degrade the land near the few water sources unless carefully managed.

EXISTING PRIVATE LAND USES

There are roughly fifty square miles of non-federally owned lands in the subarea, the majority of which are located near the Town of Ajo and north of the town along the Maricopa-Pima County line. The unincorporated town of Ajo is at an elevation of 1,798 feet. Today's population is almost 3,500, but at its peak in the 1960s when the copper mine was in full production, the population topped 7,000. The community is served by four water companies and has community wastewater treatment. It also has a country club and golf course. Although the town faced serious economic problems when the mine closed, it recovered and today's economic

base is largely based on retirees and tourism going to the nearby Organ Pipe National Monument and attractions in Sonora, especially Rocky Point.

The Town of Ajo is largely as it has existed since the height of mining in the area in the 1960's. The Town consists primarily of small lot residential development originally constructed as housing for those working in the mines and now serving as housing primarily for retirees who moved to the area after closure of the mines in the 1980's. Development of the surrounding area has consisted primarily of large lot development with conventional residential and manufactured housing. Review of files at the Pima County Floodplain Management office revealed instances of problems with drainage in the area but these were generally minor in nature.

Why is a small unincorporated area at the junction of Highways 85 and 86. The area has seen a small boom in RV parks and facilities to serve tourists. The Tohono O'odham Nation has a gambling casino at the edge of town.

Mining began in Ajo in earnest in the early 1900s when John Greenway began investing in the area. By 1916 the town of Cornelia (just north of present-day Ajo) had a population of 5,000 and mining was booming. Ajo was founded in 1920 and the New Cornelia mine became the mainstay of the economy. The peak years were in the 1960s, but in 1985 ASARCO (American Smelting and Refining Company) closed the mine because it was no longer profitable. The existing tailings ponds and open pits are a significant feature of the town. In 1997, however, the company decided to reopen the mine using new technologies that make it possible to extract copper profitably from ore with low concentrations. Once the various permits have been attained, the company projects that the mine will employ about 400 people and have an annual production of 135 million pounds of copper and 25,000 ounces of gold. Groundwater is the source of water for the mining operation and the town.

PROJECTED LAND USES

With the reopening of the mine, the population of the town can be expected to grow to accommodate the new employees. The 400 employees projected, however, are far less than the employment in the 1960s. Whether a town with active mining operations will prove to continue to be appealing to retirees is unknown.

Increased recreational use of the nearby areas may also affect some land uses in the area. A citizen group has a proposal to join the existing National Monument, the Wildlife Refuge and parts of the military bases into a National Park which would be coordinated with areas in Mexico, including the existing Pinacate National Park. While this would give added protection to the area it could also greatly increase tourism and the facilities demanded by park visitors in Ajo, Way and in the public lands themselves.

With the passage of NAFTA and the increase in tourism to Rocky Point and Organ Pipe National Monument there has been discussion of widening the highway and raising the speed limits. One alternative includes routing a new highway through the Tohono O'odham Nation instead of using the present alignment. The National Park has been opposed to widening the road or increasing the speed limit because of possible damage to wildlife and vegetation.

ISSUES FOR DISCUSSION

MINE EXPANSION

When the mine reopens, what measures, if any, should be taken to protect the water supply and drainages in the area?

WIDENING OF HIGHWAY

How should increased traffic between Lukeville and I-10 be handled? Should the current road be widened and made all-weather? Should a new road be constructed outside the National Park boundary?

INCREASED LAND PRESERVATION MEASURES

Should a National Park be established in the region?

INCREASED RECREATION

As recreational use of the area increases, are new measures needed to minimize the impacts of activities such as recreational vehicle camping and offroad vehicle use?

GRAZING MANAGEMENT

Are changes needed in how grazing is managed in the area to ensure that watercourses are not degraded?

Ranching in Western Pima County: Descriptive Summary

Introduction:

Western Pima County, located to the west of the Tohono O'odham Nation Reservation is more than 120 miles west of the Tucson metropolitan area. Comprised of principally of Federal lands, western Pima County is home to the Barry M. Goldwater Gunnery Range managed by Luke Air Force Base, Cabeza Prieta National Wildlife Refuge managed by the US Fish and Wildlife Service, and Organ Pipe National Monument managed by the National Park Service. These areas adjoin a large expanse of BLM lands that surround the Ajo and Why townsites.

Environmentally, the terrain is very rugged with a series of northwest-southeast trending mountain ranges separated by broad valleys. Elevations are quite low with mountain range peaks rising only some 1000 to 1800 feet above the valley floors, and elevations range from only 640 feet to 4542 feet above sea level. The western portion of this subarea is uninhabited, and the eastern portion remains entirely rural and largely undeveloped. Except for the townsites of Ajo, Why, and Lukeville, it is characterized by highly significant expanses of natural open space and wilderness areas that adjoin the Tohono O'odham Nation.

Western Pima County is the largest of the Pima County subareas at 1,082,281 acres (1691 square miles), except for the Tohono O'odham Nation which comprises some 2,354,910 acres (3680 square miles).

Historical Background:

The first clearly documented evidence of human activity in southwestern Arizona comes from Ventana Cave on the Tohono O'odham Reservation just east of the Goldwater Range. Projectile points excavated there were dated to approximately 11,000 years ago, along with the remains of extinct ground sloth, tapir, horse, and bison. At the end of the last Ice Age, or Pleistocene period, the vegetation even in western Pima County consisted of pinyon-juniper and grasslands, now typically at elevations above 3000 feet. This hunting adaptation suggests a nomadic existence made necessary by the need to follow the movement of large prey animals.

With the extinction of the large Pleistocene mammals and the warming of the climate, the Paleoindian tradition was eventually followed by a mixed foraging and hunting economy called the Archaic tradition, which dates roughly from 7500 B.C. to about A.D. 300. Sites from this time period exhibit assemblages of chipped stone tools and smaller projectile points, as well as simple ground stone tools that suggest milling or grinding of plant seeds.

With the adoption of agriculture and ceramic technology, the Hohokam tradition characterized the region together with the Patayan and Trincheras culture groups. Because of the marginal agricultural potential and lack of perennial water sources, the Hohokam principally occupied the river basins in the Tucson and Phoenix areas. Western Pima County was peripheral to Hohokam settlement, but was traversed by the Hohokam on shell and salt expeditions to the Gulf of California. Later, the Hohokam began to expand their settlements westward, and it appears that shell-working for trade was a significant effort undertaken by these groups in

order to supplement their otherwise marginal existence in the western deserts. A series of setbacks occurred in the 1400s, including a massive flood on the Salt River and warfare between various groups, that resulted in the demise of the Hohokam tradition. The Hohokam people are claimed to be the ancestors of various tribes, notably the O'odham and the Hopi.

Following the Hohokam collapse that occurred about A.D. 1450, little is known of the area until the Spanish missionaries and explorers entered the region in the 1540s and encountered Piman or Tohono O'odham peoples. The region was known during the Spanish Colonial and Mexican periods as "Pimeria Alta." An important route of early exploration that traverses Western Pima County along its southern boundary is *El Camino del Diablo*, the Road of the Devil. Undoubtedly used by native peoples for millennia, the first known historic explorer was Melchior Diaz, a Spanish soldier ordered to travel west to the mouth of the Colorado River by Coronado in 1540. Fr. Kino traveled the route in 1699, establishing a mission in Sonoyta and perhaps bringing the very first cattle to the region. The region became part of Mexico in 1821.

Following the discovery of gold in California in 1849, the Camino del Diablo became of significant route of travel; however, no permanent settlement of the region was attempted. With the acquisition of this region by the United States following the 1854 Gadsden Purchase, some of the first Americans to explore the area were prospective miners in search of gold and silver. Copper, however, would become the most lucrative of the mining efforts. Ajo, one of the oldest copper mines in the state began operation in 1855, with ore being shipped to San Francisco in 1856 by mule from Ajo to Yuma. The settlement of Ajo remains today the principal community in Western Pima County.

Land & Environmental Setting:

Located in the far western reaches of Pima County, this subarea is located some 120+ miles from the Tucson Basin. It is bounded by Maricopa County on the north, the Tohono O'odham Nation to the east, Yuma County to the west, and the Mexican border to the south. Its principal mountain ranges include the Batamote, Ajo, Growler, and Mohawk mountains.

Western Pima County is largely rural and undeveloped with settlements at Ajo, Why, and Lukeville. Much of the land is federally owned and managed with only limited areas that can be further developed. Western Pima County watershed reflects a range in elevation from 640 to 4542 feet, the lowest elevation subarea in Pima County.

Because of the predominantly lower elevation of Western Pima County, rainfall, is lower here than in any of the other valleys, ranging from an estimated 5 inches annually at the lowest elevations to an estimated 15 inches at the highest mountain uplands. Most of the rainfall in this watershed is estimated to average about 5-11 inches annually. This amount of rainfall covers nearly 98 percent of the subarea acreage.

Unlike much of the Basin and Range province of the greater Southwest, which support a variety of environmental zones and vegetation types, western Pima County exhibits limited vegetation diversity. Because of its lower elevations, much of the subarea is characterized by desert scrub creosote, bursage, paloverde, and saltbush.

Table 1. Major Vegetation Zones in Western Pima County Watershed in Pima County

▶ Agriculture/Pasture	127 acres	0.0 percent
▶ Urban	5539	0.0
▶ Mining	2390	0.0
▶ Cottonwood-Willow	6	0.0
▶ Marsh	2	0.0
▶ Paloverde Scrub	517,818	47.8
▶ Creosote-Bursage	542,271	50.1
▶ Saltbush	11,084	0.1
▶ Unknown	<u>3044</u>	<u>0.0</u>
TOTAL	1,082,281 acres	97.9 percent

Water is very limited in this lower elevation region; however, there are seven natural springs that are currently identified in southern portion of the Western Pima County subarea. Surface water from perennial streams does not exist, although playa-like areas on valley floors may retain some surface water for a brief time after heavy rains. Today, there are 28 stock tanks recorded in the area, principally on BLM lands. Although it is certain that Ajo, Why, and Lukeville derive their water from wells, no data for recorded wells with ADWR was available.

Table 2. Natural & Constructed Water Sources in Western Pima County

<u>Springs</u>	<u>Intermit-Streams</u>	<u>Peren-Strms</u>	<u>Stock Tanks</u>	<u>Shallow Grnd-Water</u>	<u>Wells</u>
7	None	None	28	None	Not known

Despite its lower elevation and limited surface water sources, stock tanks and wells located principally on BLM and State lands allow some ranching in Western Pima County.

Land Base & Land Uses:

All of the Western Pima County subarea is located in unincorporated Pima County. Like much of Pima County, Western Pima County is comprised of a mosaic of land ownership including federal, state, and private lands, but a very significant portion of this land is publicly owned. Approximate acreages are provided below for each kind of ownership.

Ajo, Why, and Lukeville are the principal settlement areas in the Western Pima County watershed, and the total population in the entire valley is currently estimated at only 4540 people. Private lands, comprising only 1.2 percent of the land base, are located principally in these settlements of Western Pima County, while federal lands are predominant.

Virtually all private land is used for non-ranching purposes. Only seven acres are identified by the Assessor's Office as ranch use. Because there is so little private land, most of this land comprises the townsites. Throughout Western Pima County, there are 34 platted subdivisions comprised of 851 acres all in the Ajo vicinity; however, there are approximately 3,184

separate parcels recorded with the Pima County Assessor's Office.

Table 3. Land Ownership & Jurisdictions in Western Pima County

BLM	174,846 acres	16.2 percent
State Lands	2,672	0.0
Private Lands	13,485	1.2
National Parks/Mon	327,107	30.2
Cabeza Prieta NWR	400,487	37.0
Goldwater Range	58,796	5.4
Indian Reservation	104,805	9.6
Unknown	<u>83</u>	<u>0.0</u>
TOTAL	1,082,281 acres	99.6 percent

Ranches:

As noted earlier, much of Western Pima County was part of the homeland of the Piman-speaking Tohono O'odham. Although initially explored by a Coronado expedition soldier in 1540 and Spanish missionary Fr. Kino, no permanent Spanish missions or settlements were established here, except for Sonoyta in Sonora Mexico. It was not until the Gadsden Purchase of 1854 that Western Pima County experienced its first significant wave of immigrants who were largely American mining prospectors in search of gold and silver.

With the establishment of mines at Gunsight, at Ajo, and the Quijotoa mines, among others, a number of freight and stagecoach lines were created from Tucson to the Western Pima County area. Some of these original freight and stage line roads that opened the region for settlement remain the principal routes of access today.

While mining and freighting initiated the commercial development of Western Pima County, a few others filed homestead claims for agricultural and ranching uses, although the lack of surface water made these ventures much more difficult and most failed. Only a few settlers were attracted to Western Pima County.

Ranching in the region perhaps began in earnest with the establishment of mining communities and their demand for beef during the late 19th and early 20th centuries, and these early ranching efforts were headquartered on both the US and Mexican sides of the border, near Ajo and Sonoyta.

Information provided by David DeWitt, Park Ranger/Resource Education, outlines the history of ranching on Organ Pipe National Monument. Ranching on the Monument was begun in 1917 when Lon Blankenship dug a well and brought in several hundred head of cattle. Several others had also dug wells and were grazing cattle in the area. Robert Gray moved into the area in 1919, and by 1937 when the monument was created he had expanded his ranch so that his was the main operation. In 1937 with the goal of eventually eliminating grazing in the Monument, Gray was issued a permit to run up to 1050 head of cattle with the provision that the grazing rights could not be transferred and would end with the death or departure of the

permittee. In 1969, the grazing permits were terminated; however, no action was taken to remove the cattle until 1976 when the last son died. By 1978, virtually all livestock had been removed from the monument. Today, there is only an occasional trespass of cattle onto the monument.

One of the largest ranches in the Western Pima County area belonged to Tom Childs, Jr. who in the early 1900s established a cattle operation 10 miles north of Ajo. Records indicate that his cattle ran from the Mexican border to the Gila River and as far west as the Mohawk Mountains at the western border of Pima County.

In the 1910s C. Reed and McNalley operated a ranch in the Gila Bend area, and a third ranch was established in the Sand Tank Mountains by the Clements family and later owned by Les Bender and a man named Johnson. Due to the harshness of the environment, few homesteads were established and only three main ranches were able to operate. Although the Goldwater Range was established and withdrawn in 1941 for military purposes, ranching continued in the region until 1952, when the military forced the ranchers and miners living on the range to vacate the land.

On the Cabeza Prieta National Wildlife Refuge established in 1939, cattle grazing occurred until the mid-1980s, when it was eliminated. No grazing is currently allowed, but there are occasional trespass cattle from BLM grazing lease areas and from Mexico that are found on the Refuge. Prior to the mid-1980s, there were several grazing permits with cattle and other livestock on the refuge, and many old corrals and stock tanks remain on the refuge today.

With the elimination of grazing on the three large federal preserves, grazing today is limited to the BLM lands and a very small amount of State land in the eastern portion of the subarea in the vicinity of Ajo, Why, and the western boundary of the Tohono O’odham Nation. There are only some 5 ranches, or lease holders, that operate on State and federal lands in the Ajo area, and include 1 State Trust Land grazing lease, 1 State grazing permit, and 4 BLM leases. These ranches are listed in Table 4 and are identified by the name of the the grazing lease. Tohono O’odham lands comprising some 104,805 acres are not included in the analysis; however, it is recognized that these lands in Western Pima County are probably used for livestock grazing.

Table 4. Ranches in Western Pima County Subarea in Pima County

<u>Ranch/Lease Name</u>	<u>Private Land</u>	<u>State Lease</u>	<u>BLM</u>	<u>National Forest Lease</u>
Childs			X	
Coyote Flat		X	X	
Cameron			X	
Why			X	
ASLD SLUP		X		

These ranches all utilize grazing and ranch management plans under which they implement their grazing leases.

With the exceptions of the large federal preserves, the active mining areas, and settlement

areas, Western Pima County watershed has about 280,378 acres of ranch lands, or about 26 percent of the entire subarea. Lands not used in ranching comprise some 801,903 acres or about 74 percent of the Western Pima County subarea. When tribal lands are subtracted from this analysis, approximately 175,573 acres are used in ranching, or only about 18 percent of the area.

Table 5. Ranchlands in Western Pima County Watershed in Pima County

<u>Land Owner</u>	<u>Ranch/Ag. Use</u>	<u>Non-Ranch Use</u>	<u>Total</u>
State Trust Land	720	1952	2,672
BLM Lands	174,846	0	174,846
Private Owners	7	13,478	13,485
Federal Preserves	0	786,390	786,390
Indian Lands	104,805?	0	104,805
Unclassified	<u>0</u>	<u>83?</u>	<u>83</u>
TOTAL	280,378 ac	801,903 ac	1,082,281 ac

Of all private lands in Western Pima County totaling 13,485 acres, only seven acres are classified for ranching use, and only 720 acres of State Trust lands appear to be used in grazing. There are no National Forest lands in Western Pima County, and BLM lands totaling 174,846 acres comprise the principal grazing lands. Unlike other eastern Pima County watersheds, Western Pima County has the largest amount of federal lands acreage.

Ranch improvements that have been made include corrals, fencing for lease boundaries and pasture rotation, roads, and development of stock tanks and wells as water resources for cattle and wildlife. While these improvements have not been quantified for this report, water sources that are critical to the success of ranching and for maintaining wildlife have been researched. Natural water sources are virtually non-existent in Western Pima County, and only seven springs are noted. To provide adequate water sources, approximately 28 stock tanks and an unknown number of wells have been constructed over time.

The "animal unit capacity," which defines the number of animals that can be grazed on leased ranch lands is determined by range managers for the BLM and the State Land Department in cooperation with the rancher or lease holder. This capacity is not static but reflects current range conditions that are determined by a variety of factors including soils types, tendency to erosion, natural vegetation and forage types, elevation, rainfall, the success of grazing rotation, and the recovery of natural forage following periods of grazing or catastrophic events such as fire. Periodic review of these and other factors determines the animal unit capacity or permitted use and determines the upper limit of how many cattle can be grazed to maintain the viability of the rangeland. It does not necessarily mean that ranchers always graze at the permitted maximum level. More often than not, many ranchers graze animals at lower than the permitted levels to further ensure the stability and health of the rangeland. If lands are overgrazed such that range health is compromised, the consequences of poor range health, diminished capacity, and lower economic viability for the rancher in future years are obvious.

Based on current state and federal grazing lease numbers, the current animal unit capacity of

Western Pima County watershed ranges from 1 to 3 animals per square mile depending on the terrain, location of the lease, the health of the range, seasonal forage availability, rainfall, and how it is used. At the present time, the 4 BLM leases, and 2 State leases/permits allow for a maximum of 604 animals to be grazed in Western Pima County. When this number is considered together with the total acreage of 175,573 acres, or 274 square miles, of non-Indian lands dedicated to ranching, the maximum average number of animals allowed to be grazed is approximately 2.2 animals per square mile. Grazing capacity in Western Pima County is very low compared to some other higher elevation grassland valleys; however, winter and spring annuals and grasses, jojoba bush leaves and beans, salt bush, mesquite beans, paloverde, cholla buds, and even prickly pear cactus provide seasonally available forage for livestock in the lower elevation desert scrub environment of Western Pima County.

As noted elsewhere, grazing capacity corresponds with elevation, rainfall, and forage type as shown on the enclosed figure. However, please note again that these capacity numbers reflect only today's range conditions and lease terms. The total number of animal units is likely to vary in the future dependent on climate, rainfall, vegetation cover, and range health.

Table 6. Animal Units Allowed to be Grazed in the Avra Watershed in Pima County

<u>Range of AUs Allowed</u>	<u>Acres/Sq.Miles in Grazing</u>	<u>Total AUs Allowed</u>	<u>Avg.AU/Sq.Mi.</u>
1 - 3	175,556 ac. or 274 Sq.Mi.	604	2.2

In addition to grazing, federal and state public lands may be used for hunting, camping, hiking, riding, and other recreational uses.

Current Farms:

There are no agricultural croplands in Western Pima County. Available GIS maps that indicate agricultural use of some 127 acres is probably a misinterpretation of some irrigated grass areas near the Ajo townsite.

Development Pressure & Threats to Ranching:

Development pressure in Western Pima County watershed in Pima County is very low in comparison to other subareas, but it is tending to occur along the regions road corridors and at Ajo, Why, and Lukeville. Unlike other subareas, Western Pima County has very little private land, and much of this land is already encompassed in the settlement areas. Both platted and wildcat subdivisions characterize the area.

At the present time, there are 34 platted subdivisions comprising some 851 acres in the entire region, and there are approximately 3184 recorded parcels of land. Approximately 5539 acres have been characterized as urbanized area in the Ajo portion of Western Pima County.

At the present time there are no specific plan areas of committed high density zoning for development outside the existing platted subdivision areas. Consequently, there are also no areas for "rent-a-cow" operations where a developer uses ranch land designation by the Assessor's Office to lower property taxes while waiting for the opportune time to develop lands that have been zoned for high density residential or commercial use.

Moreover, the BLM has identified no parcels for either sale, trade, or commercial lease. The ASLD has identified one Special Land Use Permit (SLUP) area located just south of Why that totals 640 acres. This SLUP is currently a 5-year grazing permit. Although a 5 year permit, the permit can be canceled at any time by the ASLD.

In summary, the development pressure in Western Pima County is very low at the current time. The landscape is nearly pristine due to the predominance of public preserves and contiguous grazing lands. Moreover, the rugged terrain, paucity of private lands, and the distance from the Tucson area and any major transportation corridors suggest minimal development potential in this area. Only the Ajo Mine has had any significant effect on the landscape in western Pima County.

Ranchland Conservation Potential:

Because the BLM and State lands used for grazing comprise a small percentage of the entire area, ranching is not a significant use of the land in western Pima County. This use, however, is likely to continue given the relative stability and long-term tenure of ranch lands comprised of BLM leases, the relatively small acreage of public lands designated for commercial use, low population pressure, the lack of private land, and long distance and access to the region from the Tucson area. Here, the natural open space of ranchlands will further enhance the protection of the significant natural and cultural values in the public preserves, and it will form a continuous expanse with the existing natural open space of the Tohono O'odham Nation that borders the valley farther to the east.

Summary & Conclusions:
















To conclude, the Western Pima County continues to support stable ranching operations that facilitate the connectivity of ranchlands with expansive public preserves. Land use in Western Pima County remains either uninhabited or largely rural. Some 175,573 acres or 274 square miles are used in ranching; however, this includes virtually no private land.

At the present time there is almost no threat from development pressure in the western portions of the county due to the predominance of public lands. Population is very low and is estimated at 4540 people, and there are no lands committed for development or specific plan areas, other than 851 acres of platted subdivisions.

Due to the significant open space, environmental, and cultural values of the region, ranchland conservation together with the existing public preserves will achieve important and practical conservation goals that are consistent with the Sonoran Desert Conservation Plan.

Pima County Ranches

SDCP PLANNING UNIT 8

-  Planning Unit Boundary
-  Ranch Boundaries
-  Major Washes
-  BLM
-  County Park
-  Indian Lands
-  Military Reservations
-  National Forest Lands
-  National Parks and Monuments
-  National Wildlife Refuge
-  Private Lands
-  State Lands
-  State Park
-  Ranch Use
-  Goldwater Gunnery Range

Pima County Index Map



Index Map Scale 1:100,000



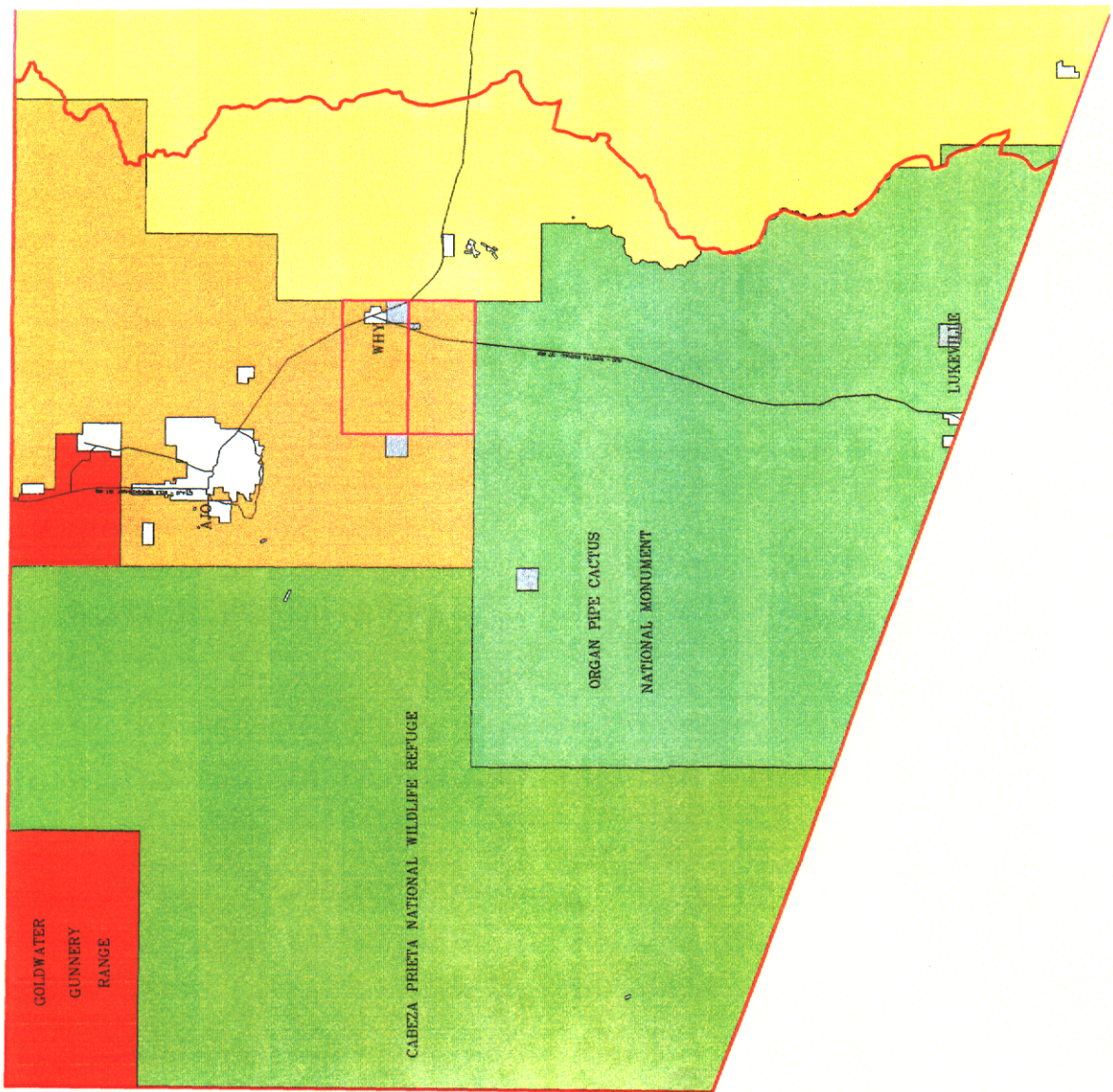
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Ranch Lands and Grazing Allotments

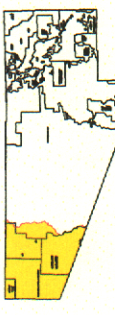
SDCP PLANNING UNIT 8

- Planning Unit Boundary
- Grazing Allotments
- Major Washes
- BLM
- County Park
- Indian Lands
- Military Reservations
- National Forest Lands
- National Parks and Monuments
- National Wildlife Refuge
- Private Lands
- State Lands
- State Park
- Ranch Use
- Goldwater Guntery Range

STATISTICS FOR PLANNING UNIT 8

BLM	174,846 AC
GOLDWATER GUNTERY RANGE	56,796 AC
COUNTY PARKS	0 AC
INDIAN LANDS	104,805 AC
NATIONAL FOREST LANDS	327,497 AC
NATIONAL PARKS AND MONUMENTS	2,676 AC
STATE LANDS	13,485 AC
PRIVATE LANDS	

Pinna County Index Map



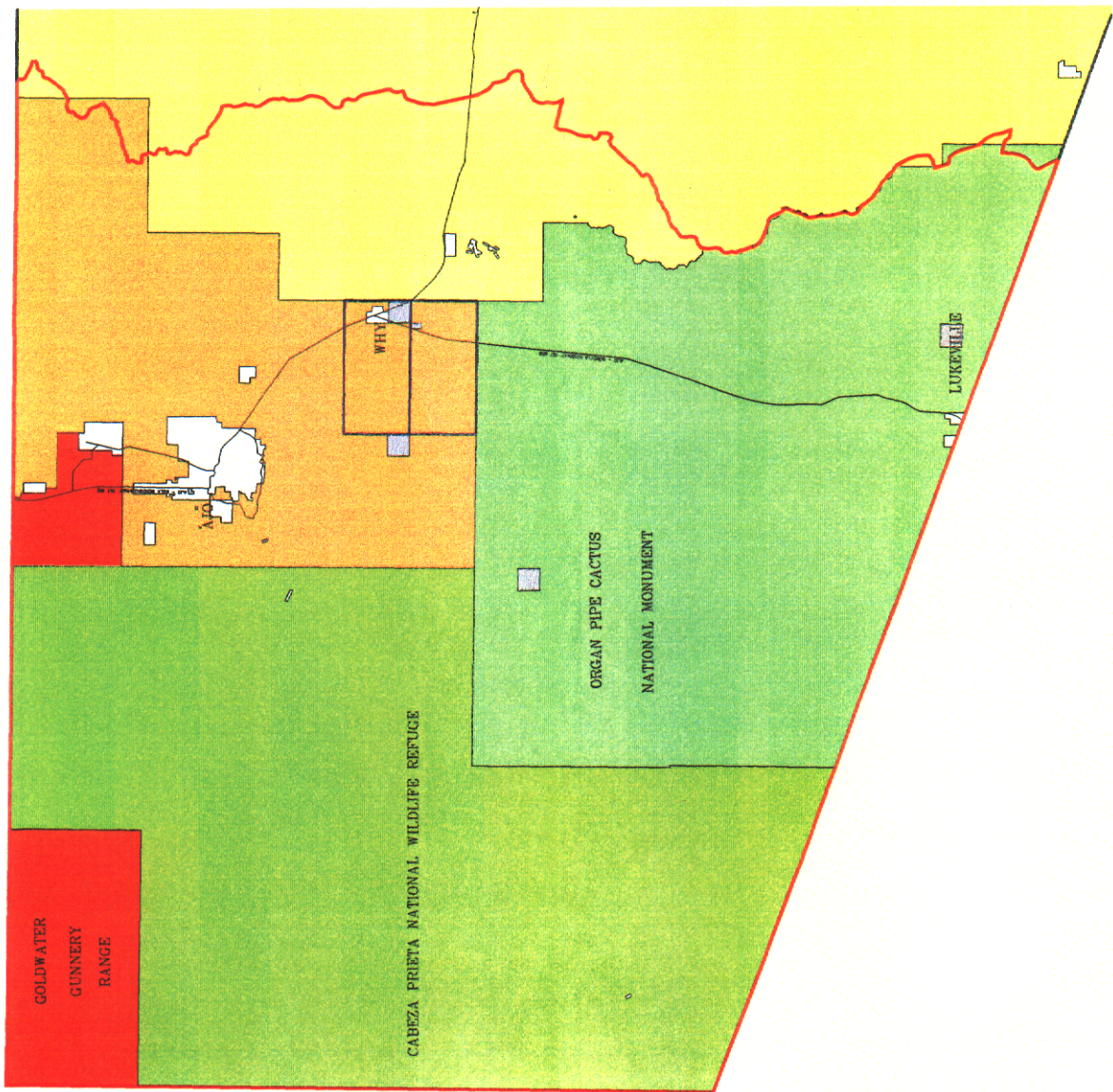
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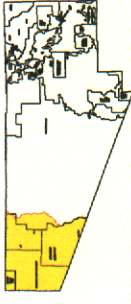
Agricultural Lands

SDCP PLANNING UNIT 8

-  Planning Unit Boundary
-  Major Washes
-  Agricultural Lands
-  BLM
-  County Park
-  Indian Lands
-  Military Reservations
-  National Forest Lands
-  National Parks and Monuments
-  National Wildlife Refuge
-  Private Lands
-  State Lands
-  State Park
-  Ranch Use
-  Goldwater Gunnery Range

STATISTICS FOR UNIT 8
ACRES OF AGRICULTURAL LAND: 0

Pima County Index Map



Index Map Scale: 1:110,000



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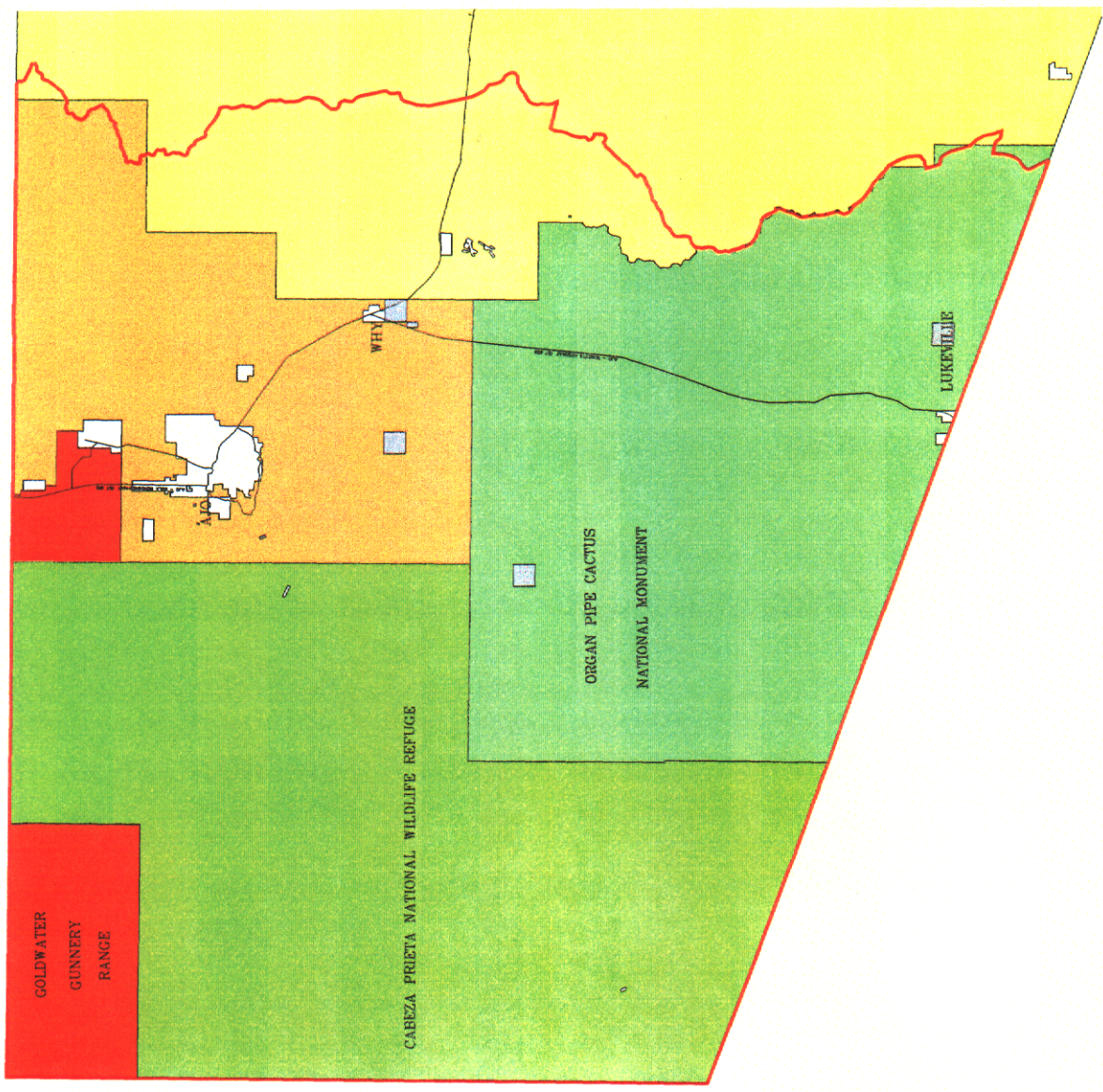
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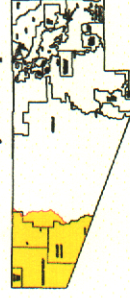
BLM Long Term Management Lands

SDCP PLANNING UNIT 8

- Planning Unit Boundary
- Major Washes
- BLM Long Term Management Lands
- BLM
- County Park
- Indian Lands
- Military Reservations
- National Forest Lands
- National Parks and Monuments
- National Wildlife Refuge
- Private Lands
- State Lands
- State Park
- Ranch Use
- Goldwater Gunney Range

STATISTICS FOR UNIT 8
ACRES OF BLM LONG TERM MANAGEMENT: 0

Pima County Index Map



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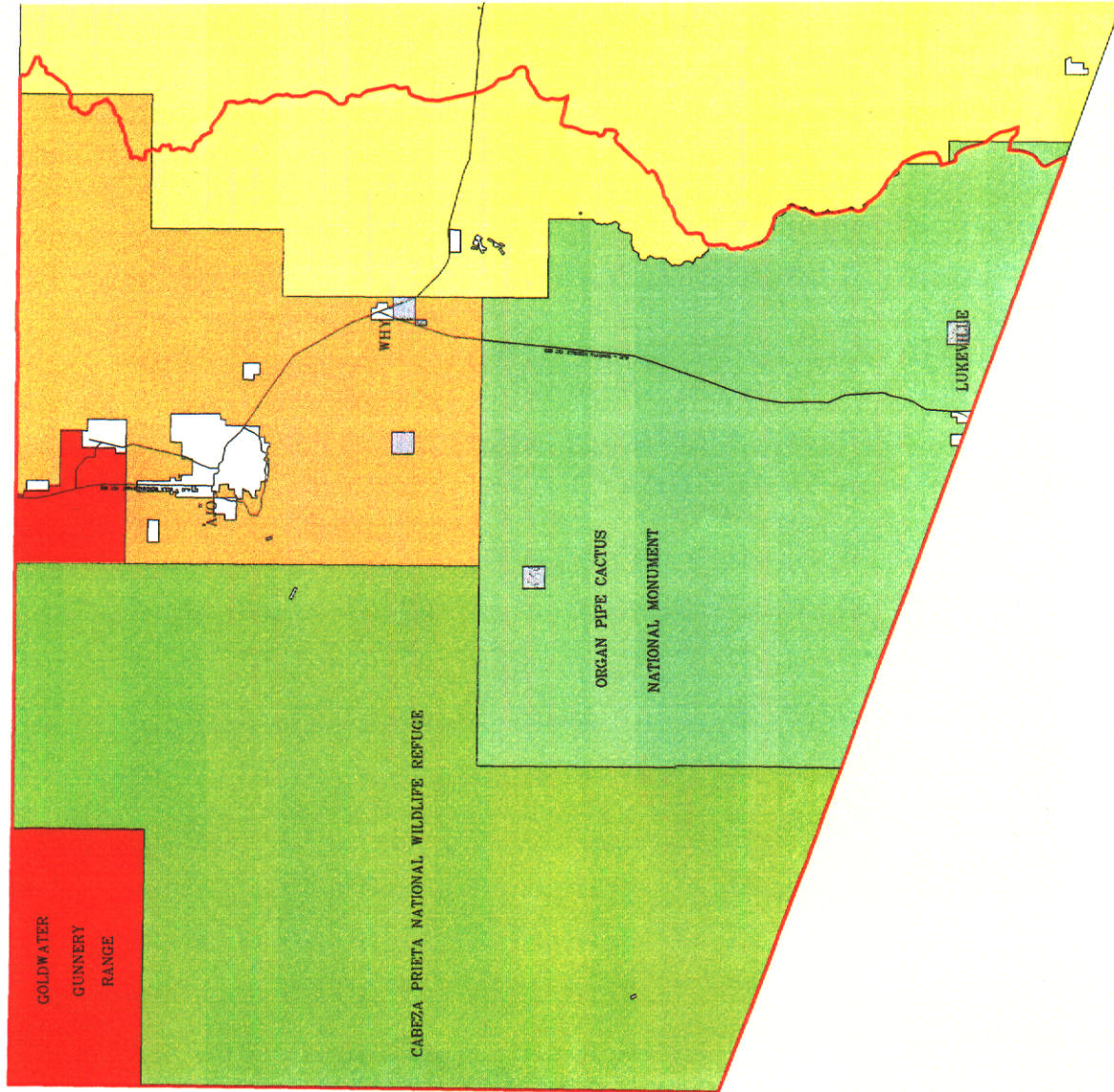
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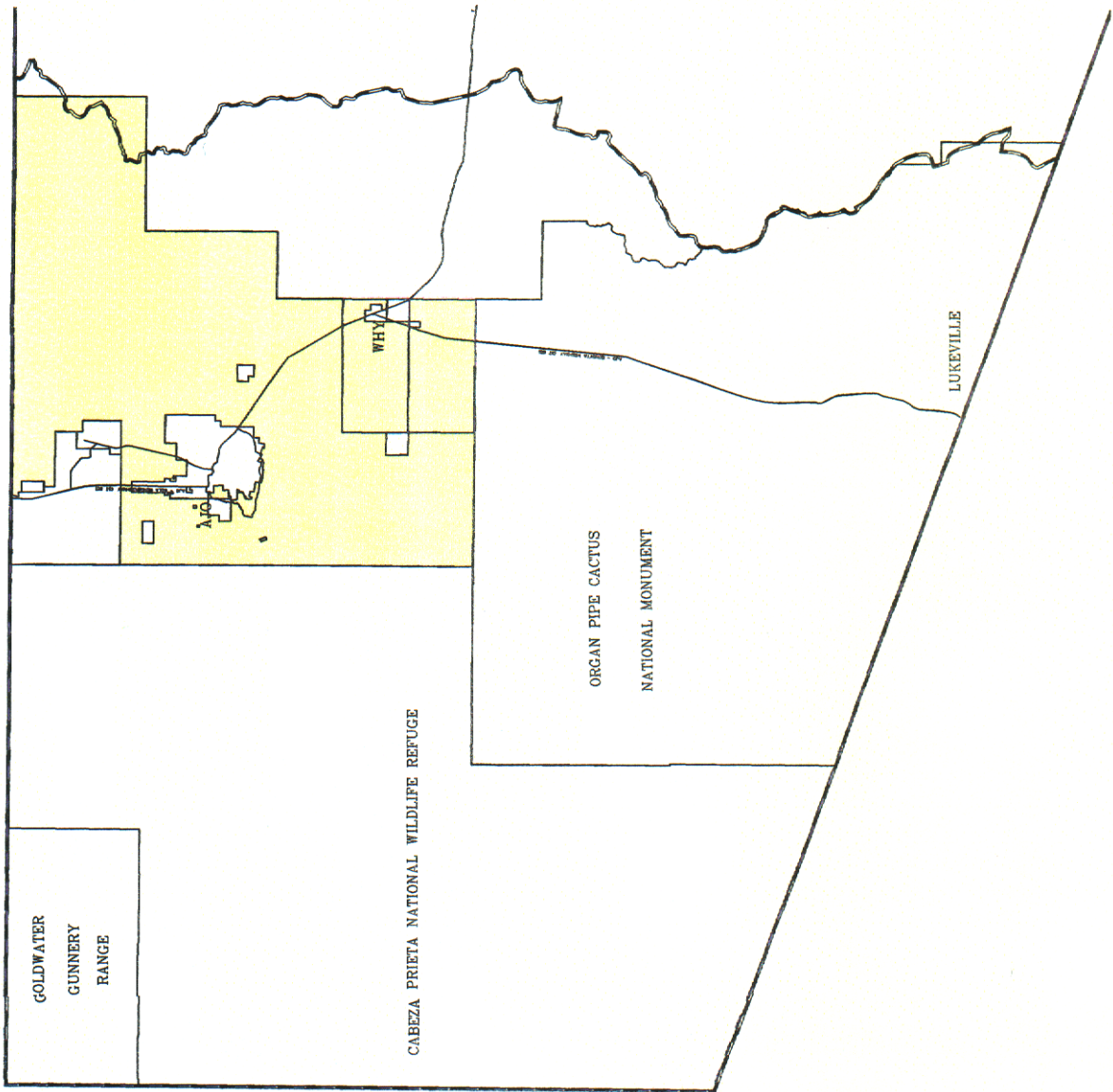
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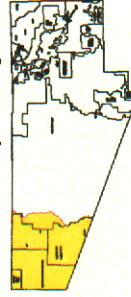
Carrying Capacity per Square Mile by Grazing Allotment

SDCP PLANNING UNIT 8

-  Administrative Boundaries
-  Grazing Allotment
-  Planning Boundary
-  Not Grazed
-  1 to 3 AUs
-  4 to 6 AUs
-  7 to 9 AUs
-  10 to 12 AUs
-  13 to 15 AUs
-  16 or greater AUs



Pinna County Index Map



Index Map Scale: 1:100,000

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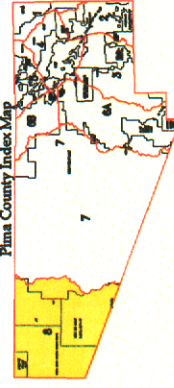


The Projected Urban Boundary Defined by Grazing Allotments and Ranch Lands in Pima County, 2005.

SDCP PLANNING UNIT 8

- Urban Boundary
- Major Roads And Streets
- Major Washes
- Grazing Allotments
- Sonoran Desert Conservation Planning Unit Boundaries
- BLM
- COUNTY PARK
- GOLDWATER GUNNERY RANGE
- INDIAN LANDS
- MILITARY RESERVATIONS
- NATIONAL FOREST LANDS
- NATIONAL PARKS AND MONUMENTS
- NATIONAL WILDLIFE REFUGE
- PRIVATE LANDS
- STATE PARK
- RANCH USE
- AGRICULTURAL USE
- Urban Boundary
- ASLD / SLUP's

STATISTICS FOR UNIT 8
ACRES OF ASLD/SLUP's 0



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Major Washes Springs and Shallow Ground Water

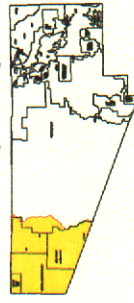
SDCP PLANNING UNIT 8

- Shallow Ground Water
- Streets And Roads
- Administrative Boundaries
- Major Washes
- Subarea Boundary
- Grazing Allotments
- Springs

STATISTICS FOR UNIT 8

Springs: 7
Length of Major Washes: 0
Area of Shallow Ground Water: 0

Pima County Index Map



Index Map Scale: 1:100,000

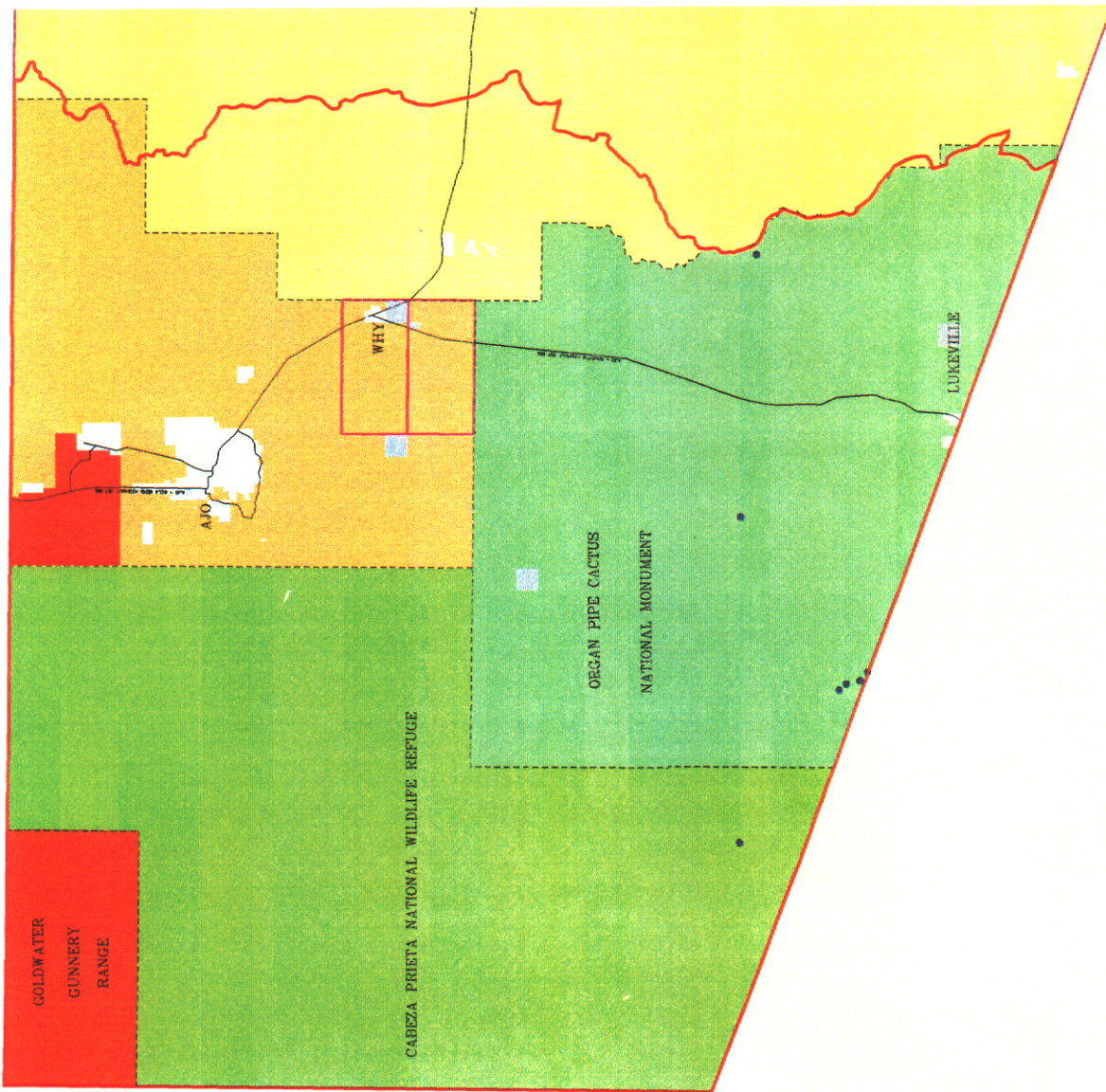


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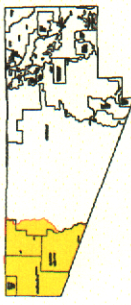
Stock Tanks and Well Sites

SDCP PLANNING UNIT 8

-  Roads
-  Administrative Boundaries
-  Major Washes
-  Grazing Allotments
-  Watershed Planning Unit
-  Stock Tanks
-  Well Sites

STATISTICS FOR UNIT 8
 Well Sites: 0
 Stock Tanks: 26

Pinna County Index Map



Index Map made 11/20/08

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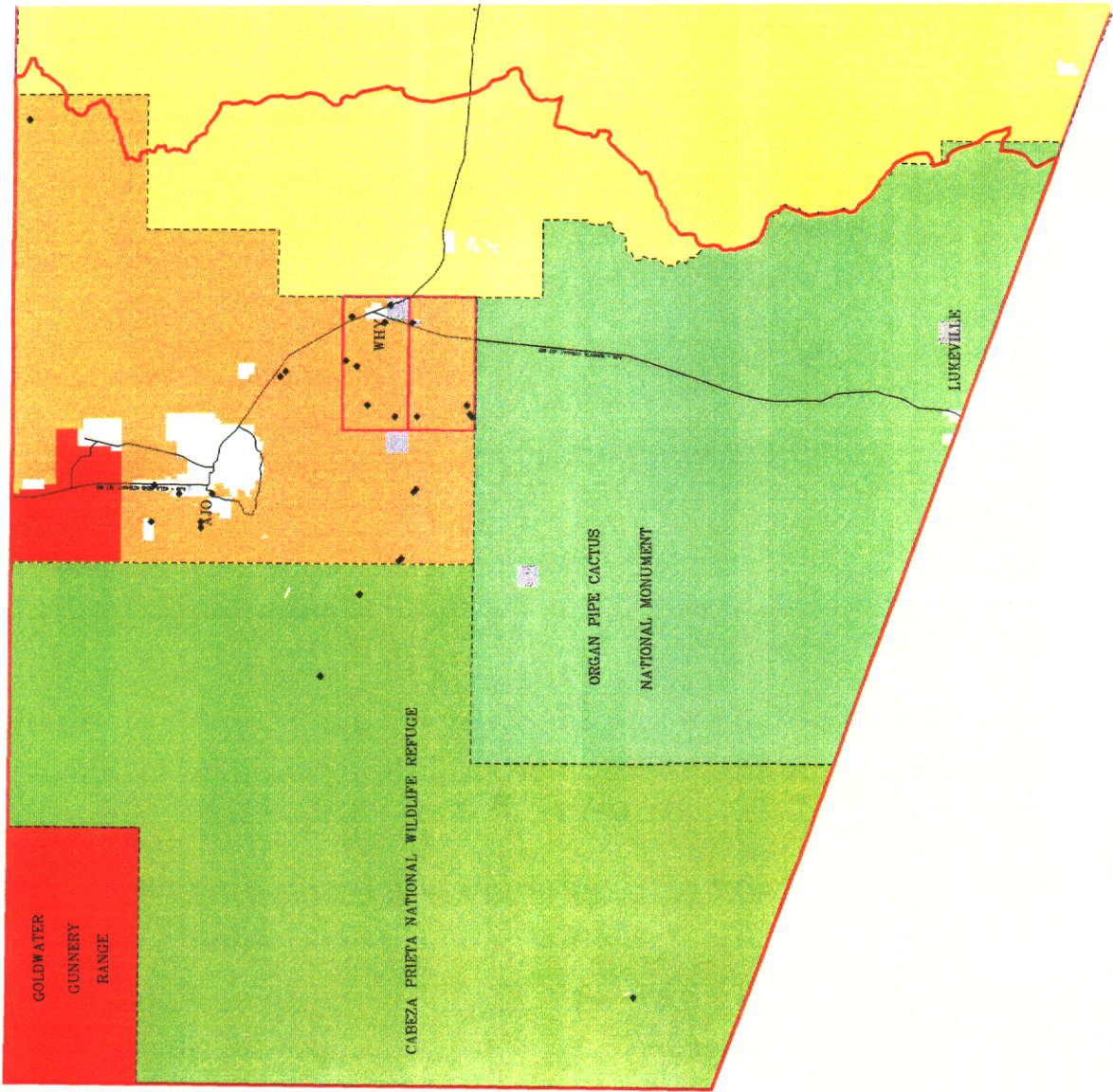
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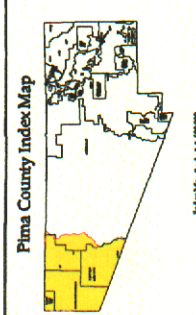
8/10/08



GAP Vegetation and Grazing Allotments

SDCP PLANNING UNIT 8

- Waterhed Planning Unit Boundary
- Grazing Allotments
- Administrative Boundaries
- Washes
- Agriculture
- Urban
- Mining
- Chihuahuan Desertscrub (Creosotebush-Tetradlea)
- Chihuahuan Desertscrub (Mixed Scrub)
- Chihuahuan Desertscrub (Whitechurn)
- Madroan Evergreen Forest (Socinal)
- Madroan Evergreen Forest (Oak-Pine)
- Madroan Montano Oakifer Forest (Douglas-Fir-Mixed Oakifer)
- Madroan Montano Oakifer Forest (Pino)
- Magollon Chaparral Scrubland (Mazuzal)
- Magollon Deciduous Swampforest (Mixed Broadleaf)
- Magollon Deciduous Swampforest (Cottonwood-Willow)
- Magollon Deciduous Swampforest (Mixed Broadleaf)
- Playa
- Scrub Grassland (Mixed Grass-Scrub)
- Scrub Grassland (Socotice-Scrub)
- Sonoran Deciduous Swamp and Riparian Scrub (Mixed Scrub)
- Sonoran Desertscrub (Creosotebush-Bursera)
- Sonoran Desertscrub (Paloverde-Mixed Oak)
- Sonoran Desertscrub (Saltbush)
- Sonoran Interior Mesquiland (Cattail)
- Sonoran Riparian and Oasis Forest (Cottonwood-Willow)
- Unclassified/Mixed
- Water

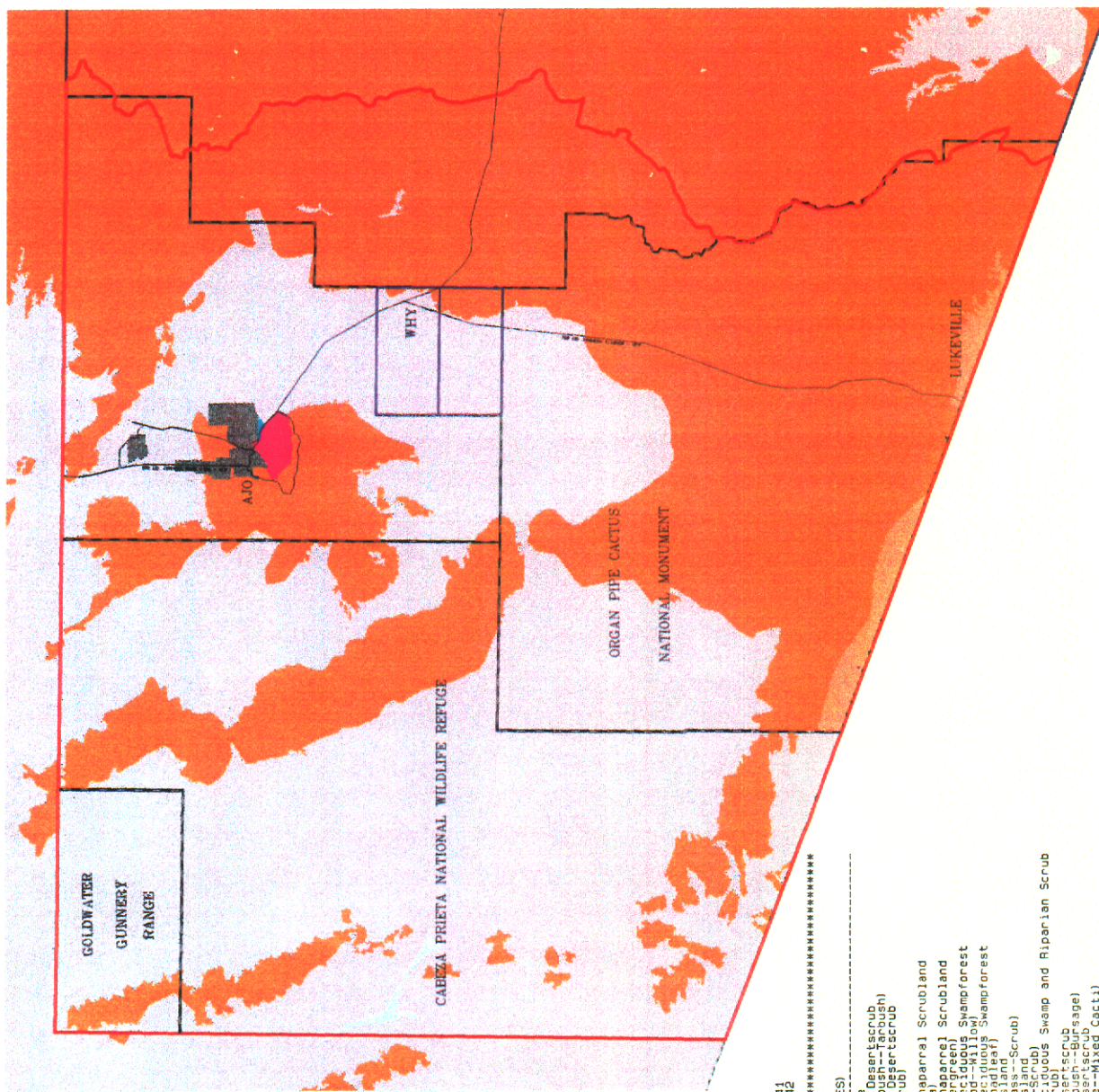


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Minimum Elevation 641
 Maximum Elevation 4,542
 VEGETATION ACRES

BIOME (SERIES)	ACRES
Chihuahuan Desertscrub (Creosotebush-Tetradlea)	120
Chihuahuan Desertscrub (Mixed Scrub)	0
Chihuahuan Desertscrub (Whitechurn)	0
Mining	2,390
Magollon Chaparral Scrubland (Mazuzal)	0
Magollon Chaparral Scrubland (Mixed Evergreen)	0
Magollon Deciduous Swampforest (Mixed Broadleaf)	0
Magollon Deciduous Swampforest (Cottonwood-Willow)	0
Mixed Broadleaf	0
Mixed Grass-Scrub	0
Scrub Grassland	0
Sonoran Deciduous Swamp and Riparian Scrub (Mixed Scrub)	0
Sonoran Desertscrub (Paloverde-Mixed Oak)	542,271
Sonoran Desertscrub (Saltbush)	517,918
Sonoran Interior Mesquiland (Cattail)	11,084
Sonoran Riparian and Oasis Forest (Cottonwood-Willow)	6
Water	5,528
Unclassified	2,020
Unclassified	937

**Sonoran Desert Conservation Plan
Western Pima County Subarea
Cultural and Historical Resources Inventory Report
May 16, 2000**

DRAFT

I. PURPOSE: The purpose of this report is to describe in summary form what is known about three kinds of cultural resources in the Western Pima County subarea: archaeological sites, historic resources, and traditional cultural places, each of which is defined below. Cultural resources inform about human history and culture, and as such, contribute to a sense of place and social identity enhancing the quality of life. However, archaeological sites, historic resources, and traditional cultural properties are limited in number and can be easily damaged or destroyed. Therefore, including cultural resources in land use planning and saving those that warrant preservation for future generations is in the public interest. This report is intended to provide baseline information needed to consider cultural resources in the Sonoran Desert Conservation Planning process.

II. SUBAREA: The subarea defines western Pima County extending from the west side of the Tohono O’odham Nation to Pima County’s border with Yuma County. The northern border is defined by Maricopa County and the southern boundary runs along the international border. Historically, this is part of the vast western Arizona desert known as the Papagueria that in the southwest corner of the state stretches from the western edge of the Tucson Basin to the Colorado River. This is an extremely arid landscape characterized by low mountain ranges and dry washes that trend in a northwesterly direction. Total rainfall ranges from 3 to 15 inches a year depending on location; overall, the desert become harsher and drier from east to west. The land base is dominated by federal lands, followed by Indian, private, and state land, in descending order as indicated on the map entitled, **Modern Communities, Transportation, and Ownership**. This area encompasses approximately 1,691 square miles.

There are three principle communities west of the reservation: Ajo, Why and Lukeville. These communities are in close proximity to the only private lands in the subarea and are surrounded by lands administered by the National Park Service (Organ Pipe National Monument), the U.S. Fish and Wildlife Service (Cabeza Prieta National Wildlife Refuge, the Bureau of Land Management and the U. S Air Force (the Goldwater Gunnery Range) and the Tohono O’odham reservation as indicated in Table 1 below.

Table 1. Western Pima County Land Ownership by Acreage and Percent		
Ownership	Acres	Percentage
Bureau of Land Management	174,846	16.1
Indian Lands	104,805	9.7
National Parks/Monuments	327,107	30.2
National Wildlife Refuge	400,487	37.0
State Lands	2,672	0.2
Private Land	13,485	1.2
Goldwater Gunnery Range	58,796	5.4
Total	1,082,198	100

Traditionally, the economy has been dominated by mining and ranching. However, Ajo in particular has become a favored location for over winter visitors and there is a growing residential and commercial sector that is associated with this growth.

III. CULTURAL RESOURCES: This section presents information and analysis of current data on archaeological sites, historic resources and traditional cultural places within the subarea.

A. Archaeological sites

Definition: “Archaeological sites are any material remains of past human life or activities which are preserved in their original setting that are important to understanding prehistory or history. These sites or districts may include occupation sites, work areas, farming sites, burials and other funerary remains, artifacts, campsites, hearths, rock art, intaglios, trails, battle sites, religious or ceremonial sites, caves and rock shelters, the architectural or other remains of structures of all kinds, such as pit houses, pueblo rooms, adobe or rock foundations, and other domestic features, usually dating from prehistoric or aboriginal periods, or from historic periods at least 50 years old, for which only archaeological vestiges remain” (Preserving Cultural and Historic Resources, Pima County, May 1999).

Archaeologists learn about the past by collecting and analyzing information in two ways: through survey and by excavation. Survey involves inspecting the ground surface in a particular area and recording concentrations of artifacts and features (hearths, roasting pits, pit houses, etc.) as archaeological sites. A site represents the physical remains of past human behavior in a single location dating to one or more periods of use through time. Surveys are often done systematically by groups of archaeologist who walk the land in regularly spaced lines looking for artifacts. Some surveys, however, are judgmental in that archaeologists only look where sites are expected to be found and not elsewhere. In all cases, survey offers an extensive perspective on past land use.

The second kind of information on archaeological sites is gained through excavation. This is the systematic recording, recovery, and analysis of artifacts and features from within a site’s limits. Critical information is gained by understanding the spatial relationship of all artifacts and features within a three dimensional context. This enables interpretation about how the site was used, by whom, when, whether the site was used more than once and what happened after it was abandoned. Often, archaeological sites are not fully excavated but are only partially sampled. This saves what is left of the site for future investigations. Archaeological excavation provides highly detailed information about the use of one limited spatial area during one or more use episodes. Archaeologist use survey and excavation data together to interpret the past; however, as new information becomes available and as new ideas about the past are developed, this interpretation changes over time.

Previous Research

Previous research in the Western Papageria can be described within three main periods of time: exploration, modern research, and cultural resources management. Exploration A.D. 1540 - 1920. The area was explored by Euro-Americans following the Spanish Colonial entrada into what is today southwestern Arizona. Francisco Vasquez de Coronado sent one of his lieutenants, Melchior Diaz, to explore the vast desert westward to the Colorado River in 1540 marking the first time this region was described historically. Later, in 1698 Father Eusebio Kino passed through what is today Organ Pipe National Monument visiting the Indian villages in the area. Kino would make a total of four trips from San Marzelo del Sonoidag to the Colorado River near Yuma and in the process established an important east/west trail known as the “Camino del Diablo.”

After Kino's death in 1711, efforts were made to continue the conversion of the native population to Catholicism until the Pima Revolt of 1751. The first prospects for copper and silver ore in the vicinity of Ajo were made around mid century. In 1774, Captain Juan Bautista de Anza used the trail as a means of linking the Santa Cruz River Valley with San Gabriel, California. The dairies of De Anza and Father Juan Diaz and Father Francisco Garces, all written in the later part of the 18th century, noted native settlements and important details of native life that would form the historic basis upon which subsequent archaeological and ethno-historic research would be conducted.

Early Anglo explorer-soldiers passed through the region as well, both before and after the Gadsden Purchase of 1853, and ruins were reported across the region. In 1894 M. J. McGee of the Bureau of American Ethnology passed through the region as did noted geographer Ellsworth Huntington in 1919-1912. Huntington participated in the Carnegie Institute study of the arid Southwest and saw evidence of extensive prehistoric occupation within the Papaguera. He was followed in 1916-1917 by Kirk Bryan a geologist with the U.S. Geological Survey who recorded details of the environment, history and the people that inhabited the western desert.

Modern Research 1920-1960. Academic and institutional research began in earnest in the 1920s. In 1929 Frank Midvale worked in the area for the Gila Pueblo, a private research foundation. His work defined the western and southern extent of red-on-buff decorated pottery helping to define the spatial and temporal limits of the prehistoric Hohokam culture. Malcom Rogers began exploring the desert of eastern California and western Arizona beginning in 1918. Hired in 1928 by the San Diego Museum of Man, Rogers spent the next 20 years scouring the desert lands. In the process, he defined another of the region's main prehistoric populations, the Patayan, ancestors of the Yuman speakers of the Lower Colorado River.

During the 1930s, Bryan Cummings, head of the Anthropology Department at the University of Arizona, visited and recorded archaeological sites in the Papaguera and in 1938, Emil Haury also of the U of A., initiated the "Papaguera Project" to explore the western extent of the Hohokam people. It was during this research that he defined the stratigraphic relationship between the Hohokam and their Archaic Period predecessors at Ventana Cave. He also coined the terms "river" Hohokam and the "desert" Hohokam to describe two different adaptations by essentially the same people. Paul Enzell of the National park Service and later the Arizona State Museum worked in the region between 1947 and 1952 and discovered a break in the distribution of prehistoric pottery types in the vicinity of the Growler Mountains, west of Ajo, defining the boundaries between the Patayan people and their contemporaries, the Hohokam.

This work was followed in the 1950s by research conducted by Julian Hayden in the Sierra Pinacate region of northern Mexico, where lacking any other means of dating, he used "desert varnish" or the patina that builds up on the exterior of rocks in the dessert over time as relative dating technique. Lastly, Bernard Fontana conducted archaeological research within the Cabeza Prieta Game Range (now National Wildlife Refuge) on a project funded by the Papago (Tohono O'odham) Indians to determine the extent of the tribe's presence in the area. Cultural Resources Management 1960- 2000. Environmental laws passed in the 1960s and enforced beginning in the early 1970s changed the nature of archaeological and ethnographic investigations in the subarea by requiring that federal agencies conduct research in advance of actions that may affect cultural resources that are eligible for listing on the National Register of Historic Places. The resulting effect on the subarea and federal lands in the surrounding region dramatically increased the number and scale of survey projects in particular. The Air Force has been especially active in conducting archaeological surveys on land that they administer beginning in the 1970s and continuing to present day.

The Barry M. Goldwater Bombing Range is an area of approximately 4163 square miles that includes portions of Maricopa, Yuma and Pima County. The Cabeza Prieta Wildlife Refuge is also used for flyover as a part of training missions. The range has seen 100s of archaeological surveys over the years ranging in size from half an acre to over 15,000 acres. Hundreds of archaeological sites have been recorded spanning the Archaic, Ceramic, and Historic Periods ranging from ancient campsites to mining prospects. A sophisticated computer data base has also been developed to help manage information on 10,000 years of human occupation in the Papagueria. Ironically, of all the sites that have been recorded during survey, only three projects have involved excavation to any degree. As a consequence, data on the archaeological record is almost completely two-dimensional.

The National Park Service has also conducted survey work within Organ Pipe National Monument in order to meet their obligation to manage the cultural resources under their administrative control. A judgmental survey was conducted within the Monument between 1989 and 1991 to provide a sample of what is within the Monument's boundaries. This involved inspecting places in close proximity to water where archaeological sites were expected, as well as, areas a mile or more away from water where fewer sites were predicted to be found. The survey resulted in the recording of 178 archaeological sites within 7,675 acres. This too produced sites spanning many thousands of years of time including temporary camps for procuring food and making tools, small habitations, and prehistoric trails, as well as historic ranching sites and mining features. Additional surveys since then have contributed to the survey coverage such that approximately 7800 acres of land have been inventoried for cultural resources representing about 2% of the Monument's land area.

The BLM reports that less than one percent of the land under their control has been surveyed, mostly in response to permit applications to mine gravel. Approximately three dozen archaeological sites from all time periods are known within the 175,000 acres that the agency manages. Survey within the Cabeza Prieta National Wildlife Refuge is represented by fewer than a dozen projects conducted between 1965 and 1994. Only a few sites have been recorded during these inventories, which collectively cover only a tiny fraction of the area. Cultural resources on private lands have been similarly limited to a few instances where Pima County development requirements have mandated investigation as part of rezoning land or as a part of grading approval in advance of construction.

Exploration, academic research, and modern day cultural resource management have resulted in a limited understanding of the human occupation of the subarea spanning the last 10,000 years. The extreme conditions of the land and its vastness have not attracted as many researchers as other more pleasant places to work. Those areas that have been explored have largely been the subject of research because of the military's need for environmental clearance and not because of the needs of academic research projects. As a consequence, the picture of the past is distorted by how we have come to learn about it. Despite this limitation, it can be said that the subarea has been occupied by human beings over the past 10,000 years or more and that uplands settings in the mountains appear to have been favored over other locations.

Survey data

Archaeological survey is the first step in characterizing the nature, age and distribution of archaeological sites within an area like the Western Pima County subarea and there are two different kinds of survey that archaeologists typically perform: Linear surveys and block surveys. Linear survey involves inspecting a right-of-way for construction of a road, sewer line, telephone cable or other linear feature. These surveys tend to be done in compliance with legal mandates requiring environmental studies during project planning. Block survey involves examining non-linear properties ranging in size from a few acres to 1000s of acres.

These are typically done either in compliance with legal mandates, or through academic or preservation related research projects like those discussed above.

Survey data for the subarea is not currently available through the Arizona State Museum data base. This is because the different federal agencies within the subarea have historically maintained their own records and have not provide them to the Museum or any other central repository. Second, the information that the Museum does have in the form of reports and paper maps has not been entered into their computer data base. It is fair to say, however, that based on what is known about cultural resources research in the subarea, only a very small percentage of the total area has ever been formally investigated, perhaps as little one or two percent.

Site Data - Chronology

Table 2 presents information on the number of prehistoric sites in the subarea by time period as reported by the Arizona State Museum. Much of this data comes from research within Organ Pipe National Monument.

Table 2. Western Pima County. Prehistoric Archaeological Site Data					
TIME PERIODS	PaleoIndian 12,000 B.C. - 8,000 B.C	Archaic 8,000 B.C.- A.D. 200	Ceramic A.D. 200- A.D. 1540	Unknown	Total
Site Counts	0	22	160	155	337

While no sites dating to the PaleoIndian Period have yet been reported in the subarea, Ventana Cave on the Tohono O’odham Nation contains evidence of occupation dating to this time period. The term “PaleoIndian” describes the earliest period of human occupation in the Americas. This was a time following the end of the last ice age when the environment was cooler and wetter than it is today. Many species of now extinct animals including mammoth, horse, camel, bear, bison, and lions lived during this period. Numerous archaeological sites found in the west indicate that hunting these large animals was an important part of the subsistence of PaleoIndian people, and as such, archaeologists refer to them as “big game hunters.” While very little is known about these people, it is believed that they lived in small groups or bands by hunting and gathering wild foods as they became seasonably available throughout the year. Archaeological evidence suggest that they were highly mobile covering thousands of square miles in a year as they moved across the landscape. Early in the succeeding Archaic Period, the environment became warmer, the large game animals disappeared, and modern plant and animal species were established.

The Archaic Period is represented in the subarea with 22, which cannot be more accurately dated based on survey data. The Archaic Period represent a time span of almost 8000 years during which human beings adjusted their way of living in response to new environmental conditions. In order to survive, people became generalists in their subsistence practices, hunting and gathering a wide variety of plants and animals and becoming more efficient in how they processed their food as indicated by the presence of grinding stones found on sites of this period. Again, people appeared to have lived in small groups by hunting a gathering wild plants and animals over large areas through a seasonal round. Sites from the early and middle parts of the Archaic are rare in southern Arizona suggesting low population levels in response to the unfavorable environmental conditions believed to exist at that time; however, toward the end of the period several significant changes occurred in southeastern Arizona laying the foundation for subsequent cultural development. First, the environment stabilized by 4500 years ago approaching modern conditions by that

time. Second, population levels appear to have increased and some evidence suggests that people roamed within more restricted territories as a result. Third, by approximately 3500 years ago, people began to experiment with growing their own food as a supplement to their diet. This change also co-occurred with more permanent settlement along well watered reaches of the major drainages in the region. In the western desert, however, there is no evidence to indicate that people there participated in the origins of agriculture and instead continued to hunt and gather their food as always.

A total of 160 sites dating to the Ceramic Period are known within the subarea suggesting population increase in the subarea during this time in prehistory. The Ceramic Period covers the time between the adoption of ceramic technology in the third and fourth centuries after Christ to the end of the prehistoric sequence around AD. 1540. It was during the early part of the period, between approximately A.D. 200 to A.D. 700, that Archaic Period populations completed the transition from mobile hunting and gathering to settled, village based, agricultural existence in southern Arizona and elsewhere. There are three ceramic bearing prehistoric cultures that lived in and utilized the western Pima County subarea: the Patayan, the Trincheras, and the Hohokam, all of whom were contemporaries. The Hohokam emerged as a distinct culture in the eighth century and dominated central and southern Arizona until around A.D. 1450. They flourished along the river valleys of southeastern Arizona, but were also well adapted to the desert lands to the west. They lived in settled, permanent villages, grew their own food using irrigation and dry farming techniques, developed a rich ceremonial life, and traded extensively with their neighbors throughout the region. These are the "river Hohokam" as defined by Emil Haury. To the west, however, archaeological evidence indicates that Hohokam populations in the Papagueria practiced flood water farming supplemented by hunting and gathering wild foods. Haury called these people the "desert" Hohokam who appear to have had ties to Hohokam population centers in the Gila Bend area as well as in the Tucson Basin. One of the main differences between the two Hohokam groups is the lack of public architecture (ball courts, platform mounds) on sites occupied by the desert Hohokam. A period of environmental instability during the A.D. 1300s is believed have weakened the agricultural economies of the Hohokam to the point where they were no longer able to produce food in sufficient quantities and with enough consistency to support large populations and the culture collapsed around AD. 1450. The Hohokam are believed to be the ancestors of the Pima speakers including the Tohono O'odham

The Patayan lived to the west of the Hohokam occupying much of the western Arizona Desert from Ajo and Gila Bend to the Colorado River northward to the Grand Canyon between A.D. 600- AD. 1850. Very little is known about this group. What is known suggest that the Patayan practiced a diverse economy traveling through riverine, lowland and uplands areas, growing corn and other crops where circumstances permitted, and otherwise gathering wild foods according to seasonal availability. The Colorado River provided access to fish, waterfowl and soil and water to grow crops, whereas the uplands provided game, pinon nuts and agave. They lived in small dispersed settlements; however, larger communities were established along the Colorado River. Their distinctive pottery is found on western Hohokam sites suggesting considerable contact and interaction between the two cultures. It is believed that the Patayan were the ancestors of the Yuman speakers who historically occupied the Lower Colorado and Gila Rivers, as well as, the Upper Colorado River area.

The Trincheras culture was primarily Mexican in origin and has been identified on sites in the Altar Valley of Sonora and areas to the south. Sites of this culture have been dated from approximately A.D. 600 to A.D. 1690. The Trincheras people also practiced agriculture, lived in distinctive hill side communities, produced an easily recognized purple on red decorated pottery that is found on sites throughout the region indicating trade and exchange with the Hohokam and the Patayan.

Following the collapse of the Hohokam in A.D. 1450, the region is believed to have been occupied in very low numbers by an O’odham (upper Piman speaking) people whose settlement and subsistence practices reflect a return to an earlier, simpler way of living. Life continued to involve the cultivation of crops supplemented by hunting a gathering, but the level of technical sophistication and social and religious cohesion characteristic of the Hohokam is missing in these later populations. These people are believed to be the descendants of the Hohokam, but are recognized as separate culture groups. Archaeologists know very little about the period that represents the end of the Hohokam and the beginning of the Spanish Colonial presence in southern Arizona. It appears to have been a time of flux when the vacuum left by the disappearance of the Hohokam was filled by groups that by the 17th and 18th centuries the Spanish recognized as Quechan and Cocopa and other Yuman speakers of the Lower Colorado and Gila Rivers, the Hia C-ed O’odham (Sand People), the Tohono O’odham (desert People) who occupied the arid Papagueria, and the Sobaipuri of the Santa Cruz and San Pedro River Valleys to the east

Several sites dating between the time following the Hohokam collapse and the beginning of Spanish settlement are known in the Tucson Basin and the San Pedro River and several more have been reported in the Ajo Range and along the Santa Rosa Wash within the subarea. Organ Pipe National Monument reports a small number of O’odham sites dating to this time period and a few more sites of unknown ethnic identity are known from the State of Sonora in Mexico. The one characterization that is true of all of these areas is just how little physical evidence there is for this time period. Most of what is known comes from the accounts written by Spanish explorers who entered into the region in the 16th 17th and 18th centuries.

Table 3. Western Pima County Subarea Historic Archaeological Site Data					
Euro-American	Mexican	Tohono O’odham	Hia-Ced O’odham	Unknown	Total
26	3	30	1	1	61

Table 3 presents archaeological data on the Historic Period, spanning the years between A.D. 1540 and 1950. The historic period covers that time during which Euro-Americans entered into the southwest region and established permanent settlements beginning with Santa Fe in 1610 and later in Tucson in 1692. As mentioned above, little is known of the Native American Population until Father Eusebio Kino established his mission in the Santa Cruz and began to explore the region. Historically, the Tohono O’odham lived in small, dispersed settlements or *rancherías* consisting of circular, dome houses made of mesquite saplings, coarse grasses, ocotillo stalks and saguaro ribs covered with dirt. They were agriculturalists who followed a dual settlement pattern where during the summer they settled in the lower bajadas of the river valleys to plant and in the winter moved to the upper bajadas near springs to hunt. They also used cactus camps to harvest saguaro fruit in the summer. This is the pattern of life that Kino and others described when visiting with the O’odham, a pattern that continued into the late 19th century.

Three major forces influenced Euro-American use of the region: travel, mining and ranching. As mentioned, the Camino del Diablo was established as an important east west trail early in the history of Spanish occupation in the region. A second north south route was also used during the 18th and 19th centuries that started in Sonora and followed the Quijotoa Valley to settlements along the Gila River. While copper and silver deposits in Ajo were well known to the Spanish by the mid 18th century, Anglo-American efforts to make the Ajo mines produce didn’t begin until 1854 and focused initially on the limited silver deposits.

After that time, copper ore was mined at Ajo but had to be hauled by wagon to the Colorado River, a venture that quickly proved prohibitively expensive. It wasn't until 1916 that a rail link was established between Ajo and Gila Bend that the mines in Ajo were able to produce copper in large, commercially viable quantities. Copper mining boomed throughout Arizona during the First World War, but later suffered terribly during the depression years of the 1930s. The Second World War revived the local economy, which once again slumped in the 1950s with a downturn in world copper prices; this boom and bust cycle continues to effect the fortunes of the community of Ajo.

Ranching too followed the Gadsden purchase with ranches being established in the mid to late 19th century. Of necessity, ranching tended to concentrate around sources of dependable water. One of the most successful ranchers in the subarea was Thomas Childs, Sr, who following the Civil War, established a large ranching operation out near Ajo that eventually extended from Ajo to Gila Bend and west to the Mohawk Mountains. By the early 20th century, other ranchers had moved into the subarea. To the south, Robert Louis Gray and his three sons, established a large ranching operation involving 15 properties within the area that is today Organ Pipe National Monument. The Gray Ranch was in operation from the 1920s to the 1970s. Homesteading also occurred, but the lack of water together with the severity of the climate made this a risky venture despite changes to the Homestead Act of 1862 that expanded the acreage homestead claims.

Before the end of the Second World War, the department of defense began to develop military bases and training facilities in southern Arizona, which were greatly expanded as the United States entered in the "cold War" from 1945 to 1989. The Barry Goldwater Bombing Range, established in 1986 as a part of Luke Air Force Base, is a direct result of the geo-political forces that have shaped the modern world.

Sixty-one Historic Period sites have been identified in the Western Pima County subarea as presented by the Arizona State Museum. Most of these data were collected within the Organ Pipe National Monument. Twenty-six are Euro-American, three are Mexican American in ethnic origin, 30 have been identified as Tohono O'odham, one is believed to be Hia C-ed O'odham and one is unknown. As mentioned, extremely low survey coverage, the greater visibility of some sites and not others, and a lack of research interest in the archaeology of the historic time period distorts the true picture of historic period land use in the subarea. It is notable, and to be expected, that the largest number of sites identified as O'odham in any subarea in Pima County should be in this subarea, which is a part of the traditional use lands of the Tohono O'odham people.

Despite the scarcity of data, it is apparent that the Western Pima County subarea has much more to offer in the study of long term human adaptation to desert environments. It is also apparent that jurisdictional responsibilities have in the past lead to a failure to share information in a way that could facilitate comprehensive analysis of all that is known of the region. While past academic research has pointed in a number of interesting directions, the dictates of cultural resources management have taken over, and as such, little research is being done that is not directed by either management needs or development.

Site Data - Function

The site data from both the historic and prehistoric eras can also be examined from a functional perspective to highlight land use trends within the subarea. The following is a summary of archaeological site data for the subarea that is presented by gross time period and site function. These data are made available by the Arizona State Museum, University of Arizona.

**Table 4. Western Pima County Subarea
Archaeological Site Data Time Period by Site Function**

PERIOD	Prehistoric	Historic	Both	Unknown	Total
FUNCTION					
Agriculture	2	2	0	0	4
Art	6	0	0	1	7
Defense	0	0	0	2	2
Disposal	1	1	0	0	2
Government	0	0	0	0	0
Habitation	24	9	0	0	33
Resource Processing	33	1	0	2	36
Resource Procurement	17	10	0	3	30
Religion	2	7	0	0	9
Storage	1	0	0	0	1
Transportation	9	3	0	1	13
Unknown	242	28	0	36	306
Total	337	61	0	45	443

The site counts presented in Table 4 show that prehistoric sites outnumber the historic by more than five to one; none of the reported sites had occupations from both major time periods present on the same site. The prehistoric site counts are dominated by Resource Processing (food and non food resources) and Habitation (residential) as the most common of the identifiable site functions. Resource Procurement, such as a hunting blind or a rock quarry are third in frequency. Transportation, which includes trails and roads, is usually a site function that is associated with historic period occupations; however, in this case, the region is known to be criss-crossed with trail systems that were developed and used in prehistoric times. Nine such trails are recorded. Six sites functionally categorized as Art (rock art) are present; sites with a religious or ritual function are represented by two sites as are sites associated with agriculture. Storage uses and trash disposal are represented with one site each. As is the case in the other subareas in Pima County, the largest number of prehistoric sites cannot be functionally identified based on survey data.

The historic sites emphasize resource procurement (11) and residential (10) uses in almost equal numbers. It is interesting to note that seven sites are identified as having religious functions, which proportionally is very high, much higher than prehistoric sites with the same function. Sites of this nature include shrines as well as graves. Transportation functions (roads and trails) are represented with three sites. Site counts for

Agricultural uses (2), trash disposal (1) and Resource Processing (1) are last. Since half the Historic Period sites are O'odham in ethnic origin, the functional breakdown presented above reflects a high degree of use by Native Americans, thus it is notable that so few sites are functionally identified as Resource Processing. It may be that some of the 36 sites that temporally and functionally unknown include sites associated with Historic Period Resource Processing.

Of all sites from both the prehistoric and historic time period, the data presented in Table 4 indicates that site use within the subarea is dominated by Resource Processing at 36 sites. Residential needs are represented by Habitation sites and is the second highest site function by count (33), followed by Resource Procurement with the third highest frequency of sites (30). The site counts for Transportation (13) and Religion (9) have very high proportional representation in comparison with other subareas and perhaps reflect a different reality to life in the desert. The counts for sites with functions associated with Art (7), Agriculture (4), Defense (2), Disposal (2), and Storage (1) finish out the site data.

To sum the information on archaeological sites, the Western Pima County subarea suffers from a lack of archaeological attention and only a fraction of the area has witnessed intensive archaeological survey and even less site excavation. Because of this temporal and spatial patterning can only be guessed at. Nonetheless, the following statements can be made based on the archaeological record: 1) It is evident that human beings have occupied the subarea for many thousands of years, with a peak occupation occurring during the period between approximately A.D. 800 and A.D. 1450; 2) Three district cultural groups lived side by side and interacted with each other during this time period; 3) certain parts of the landscape have been more heavily utilized than others particularly the uplands of the regional mountain chains where water and certain plant communities co-occur; 4) the predominant use of the landscape relates to procuring and processing food and non food resources and meeting residential needs.

.B. Historical Resources

Definition: "Historical resources are sites, districts, structures, objects, or other evidences of human activities that represent facets of the history of the nation, state, or locality. Also places where significant historical or unusual events occurred even though no evidence of the event remains, or places associated with persons significant in our history that have gained importance in the last 50 years" (Preserving Cultural and Historic Resources, Pima County, May 1999).

Historical resources are largely constructed or engineered elements of the built environment including buildings used for residential purposes, such as houses, but also commercial stores, industrial facilities, civic centers, and places of worship. Roads, bridges, irrigation canals, mining works, and railroad tracks are also historical resources. Information on these places is recovered through drawings and design plans, photographs, maps, surveys, and personal recollections.

The Western Pima County subarea has a number of places of historic importance including occupied historic communities, abandoned settlements or ghost towns, places that have been recognized for their historic value and registered on the National Register of Historic Places, and a historic trail. These are represented on the attached map entitled, "**Western Pima County Historic Resources.**"

Historic Towns: The following table lists historic communities in the subarea and either a founding date or the date the post office was opened.

- Ajo. Ajo is a copper mining town that formed around one of the oldest mines in the state having been

worked continuously since 1855. The name Ajo means “garlic” in Spanish, which was bestowed on the settlement in 1854 for the garlic like plants that grow in the area. Historically, the mines were worked off and on during the later half of the 19th century, starting first with silver ore and then switching to copper. During these years, the mining was limited by the high cost of transporting ore by wagon to the Colorado River. Ore reduction became feasible in the early 1900s and the New Cornelia Copper Company was formed to take advantage of this technology. After a rail link was established between Gila Bend and Ajo in 1916, copper production boomed. Busts followed during the Great Depression years with another boom-bust cycle starting with the Second World War and the years that followed. The mines at Ajo have been silent since 1984; however, winter tourism has gained increasing popularity bringing with it economic benefits to the community.

Ajo is also notable as an example of a planned community built by the Calumet and Arizona Mining Company. In 1914, John C. Greenway, General Manager of the mine, hired several architects to design and build a town for the company’s employees. The plan, inspired by the “City Beautiful” movement of the early 20th century, incorporated landscaping, public facilities and high quality housing to create a pleasing aesthetic for the miners and their families. The company believed in the progressive notion that happy workers are productive workers and this is reflected in the care and attention that was put into this massive project. The town site was dedicated in 1917 and built out through a series of phases over the next 30 years. The historic core of Ajo is currently being nominated to the National Register of Historic Places.

- Childs. Thomas Childs arrived in the Ajo Valley in 1884 and by 1890 he and his son Tom Childs, jr. had gone into ranching. By the early years of the 20th century the Childs family owned a ranch that stretched from Ajo to Gila Bend and west to the Mohawk Mountains, making it one of the largest ranching enterprises in the region. The community is named after these enterprising ranchers.

Ghost Towns: Many historic communities developed only to be abandoned. These places were typically mining towns, or in some cases, milling towns, that thrived until economic forces eliminated the driving force of their existence. Established during the later part of the last century and early 20th century, these places remain time capsules that reflect by-gone eras. Known ghost towns in the subarea are listed below.

- Clarkstown. Opposition to the company owned town in Ajo led Mr. Sam Clark to stake out a new town site near the copper mine reduction works. However, the company would not sell water to the new community and so the residents deepened a test shaft to access water. By 1917 Clarkstown (or Clarkston) had 1000 residents. Residents wanted to name the community Woodrow, but this was rejected by the Post Office Department, and so for a time the community was known as Rowood (Woodrow spelled backwards). In 1931, the town was virtually destroyed by fire and the residents moved to Ajo.
- Gunsight. In November of 1878, the Gunsight Mine was located by prospectors and named because it was near a mountain that looked like a gunsight. It proved to be rich in silver ore. Miners attracted to the new operation formed the Gunsight camp. By 1892 the mine was producing under the Silver Gert Mining Company. Forty men were employed and eight buildings were constructed. The post office opened in 1892 and was closed four years later in 1896.

National Register Properties: The National Register of Historic Places were created as a part of the National Historic Preservation Act of 1966. It is the nation’s premier honor roll for places deemed of national, regional, or local importance. The criteria for listing include a) association with a person who has

contributed to history; b) association with an event important to history; c) associated with the work of a master artist or craftsman or typical of a style or type of workmanship; d) yielding or having the potential to yield information important to history or prehistory. Listing in no way effects the rights of private property owners to do what they wish with their property. Federal agencies; however, are required to consider the effects of their actions on listed properties.

- **Bates Well Ranch.** This is the ranch owned by Henry Gray, son of cattleman Robert Louis Gray. The ranch house is the primary building at Bates Well and is representative of the Early Transitional, Sonoran to Anglo, style of architecture dating to the 1930s and 1940s. Other buildings are included including a hay barn/bunkhouse, a tack house, an blacksmith shop and two corrals. Henry was one of three sons of cattleman Robert Louis Gray, who ranched within what is today Organ Pipe National Monument. The property was listed on the National Register in 1994 (not shown on the Historic Resources Map).
- **Bull Pasture.** This grassy basin located in the upland of the Ajo Mountains is the site of a natural water hole or tank. Known as the “Tinajas de los Torres,” it is significant for its prehistoric archaeological deposits representing thousands of years of visitation by desert dwelling Indians in the region. It was also used by ranchers to water their cattle in the early 1900s and by the U.S. military during the Mexican border crisis of 1915-1917. Today, the site is within the Organ Pipe National Monument. It was listed on the National Register in 1978 for its association with historic and prehistoric settlement in the area.
- **Dos Lomitas Ranch.** This is the name given to the main ranch owned by Robert Louis Gray, Sr., and is a good example of 1920s vernacular architecture associated with in the Sonoran Tradition. Gray was an important figure in cattle ranching in the southern part of the subarea. The property is within Organ Pipe National Monument and was listed in 1994 (not shown on the Historic Resources map).
- **El Camino del Diablo.** This historic trail follows a series of tinajas or water holes along a route stretching from northern Mexico to California. It was first traveled by father Eusebio Kino between the years 1699 and 1702 and was subsequently used by a variety of people including Juan Bautista de Anza, Captain of the Tucson Presidio, who in 1774 traveled along the route in his quest to find a land route to California. Later, the route was used in the 1840s and 1850s by miners on their way to the gold fields of California. While treacherous, it provided an “Apache free” corridor to the west; as safer and shorter routes were opened, the trail was abandoned. Today, portions of the trail are located within the Cabeza Prieta Wildlife Refuge and follows the International Boundary between Mexico and the U.S. It was listed on the National Register in 1976 for its historical associations.
- **Gachado Well and Line Camp.** Located close to the U.S. Mexican border, the Gachado Well and Line Camp is a representative feature of the development of the ranching industry in southwestern Arizona early in the 20th century. The well, named for the Spanish word to “stoop”(agachado), was dug between 1917 and 1919 by Lonald Blankenship, an early rancher in the area; it is possibly the location of a natural spring based on claims made by the Tohono O’odham Indians. In 1919 the property was sold to Robert Louis Gray, who ranched the area during the 1930s. Gray built an adobe house and a corral at the site. In later years, the house served as a line camp where cowboys stayed while attending cattle. The Gray ranch lasted from the 1920s to 1976. Today the well and line camp are within the limits of the Organ Pipe National Monument. The site was listed on the National Register in 1977 for its significance to regional history

- Growler Mine. Also located within Organ Pipe National Monument is the Growler Mine. This mine represents one of the earliest and most extensively worked copper mines south of Ajo, Arizona. It was named in the 1880s and by the 1890s a small community had developed nearby called Growler Camp. High grade copper ore was extracted in large quantities beginning in the early 20th century. Production peaked in 1916 and was closed by 1928. The mine and related buildings and facilities was listed on the National Register for its association with the history of mining in the region in 1978 (not shown on the Historic Resources Map)..
- Milton Mine. This mine is a surface mine located just north of the Mexican border in the Puerto Blanco Mountains. The property consists of an open trench dug into the natural rock to expose gold and copper ore. The cut is about 30 feet deep and 300 feet long and is representative of a simple form of mining used in the early years of the 20th century. It was used off an on between 1917 and the 1960s. Today, the mine is located within the limits of Organ Pipe National Monument. It was listed on the National Register of Historic places in 1977 for its association with historic mining practices of the early 20th century.
- Victoria Mine. This mine is one of the oldest known examples of mining activity in the country immediately adjacent to the U.S. Mexican border in southwestern Arizona and symbolizes one of the first American enterprises to penetrate this part of the Sonoran Desert. Known for its rich silver deposits, the mine was discovered around 1880 and worked off and on by various owners until 1941. The site contains ruins of the mining operation including the remains of a store, a cistern, head frame timbers, and a large shaft hole. Today the mine with within Organ Pipe National Monument. It was listed on the National Register of Historic Places in that 1977 for its association with historic mining.

Trails: In many places historic and even prehistoric trails crossing the landscape often become the basis for historic roads and modern highways.

- El Camino del Diablo. As noted above, this historic trail was used by early Spanish missionaries and explorers, and later by Mexican and American miners seeking their fortune in the gold fields of California in the Middle 19th century.

To sum the discussion of historic resources, the subarea contains a variety of places that are symbolic of different historic forces that have affected southern Arizona and the nation as a whole ranging from 18th Spanish Colonial expeditions into the unknown, to 19th and 20 century ranching and mining enterprises.

C. Traditional Cultural Places

Definition: “A traditional cultural place is a historic site or district that is important because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community. The traditional cultural significance of an historic property is derived from the role the property plays in a community's historically rooted beliefs, customs, and practices” (Preserving Cultural and Historic Resources, Pima County, May 1991).

Pima County has been occupied by indigenous peoples for thousands of years and the modern descendants of these prehistoric cultures still live in the region today. All of Pima County is claimed as ancestral lands by the Ak-Chin Indian Community, the Gila River Indian Community, and the Tohono O’odham Nation. The Piman speaking groups (including the Salt River Pima Maricopa Indian Community) claim direct

ancestral affiliation with the prehistoric Hohokam Indians who inhabited much of southern and central Arizona. Other Indian groups also claim ancestral ties to the Pima County area including the Zuni of central western New Mexico and the Hopi of northeastern Arizona based on oral histories and myth that identify southern Arizona as a place of origin for these tribes. The Apaches also lived in the region for hundreds of years and therefore they too can claim an ancestral connection to the land and the places of traditional value to them that it may contain. Other groups with potential claims to places of traditional cultural value include the Hispanic and Anglo communities. Places of traditional cultural value, as defined, are special to the community and must often remain secret to non-members; this is particularly true among Native Americans. These might be places where in the past natural resources were collected for ceremony or where natural features on the landscape are still recognized as having significance. Two such places are known in the Subarea.

- I'toi Mo'o (Montezuma's Head) is a natural feature in the Ajo Mountains that is associated with the creator figure, I'toi Mo'o, sacred to the Tohono O'odham people.
- Quitobaquito Springs near the international border is the site of a natural Tinaja or water hole that is also sacred to the Tohono O'odham people.

Other places with traditional cultural value of particular importance to Native Americans are rock art sites and all archaeological sites containing human graves. Six sites within the subarea are identified as prehistoric rock art localities and in addition, 24 prehistoric sites were used for habitation, which often contain human graves. It is reasonable to assume, that Native Americans would identify these places as having traditional cultural value. More than likely, there are many places with these kinds of values that exist in the Western Pima County subarea.

IV. THREAT ASSESSMENT: Lack of archaeological site and survey data prevents a detailed analysis of where these kinds of cultural resources are located with regard to land jurisdiction. However, with 98.4% of the land under federal control and subject to federal and tribal preservation law, it is highly likely that the majority of cultural resources within the subarea area are legally protected. Private lands, concentrated mostly in the vicinity of Ajo, make up just 1.4 percent of the subarea, and state lands even less at 0.2%. That is not to say that cultural and historical resources have not been lost, and are not now threatened with loss, but that these are comparatively low.

Resource Loss:

There are three principal sources of cultural resource loss in the subarea: Military related development, mining, and urbanization. military use of the Barry M. Goldwater Bombing range in the north west portion of the subarea is likely to have resulted in some loss, although mitigation of effects is legally required for any cultural resource found to be eligible for listing on the National Register of Historic Places. As a matter of both policy and practice, the Air Force avoids affecting cultural resources when ever possible and plans around places containing them so the losses to cultural resources are minimized. Mining in the Ajo area in particular is known to have impacted archaeological and historical resources as the mine works have expanded over the years impacting older areas and the resources they contain. However, since the mines have been inactive since 1984, little activity has occurred that has resulted in loss. Development of private land has almost certainly resulted in the loss of cultural resources; however, this is subject to Pima County development controls affecting rezoning and grading. The extent of these activities has been minimal in recent years. In short, while cultural resource losses have occurred in the past, the extent of this loss can be characterized as minimal.

Resource Threat:

One source of potential threat to cultural resources in the subarea at the moment is private residential and commercial development. Again, it is fair to say that the extent of this threat in the subarea is low given the degree of private development that is ongoing in the subarea. Should the mine start up operations, however, the associated increase in private development would pose an elevated threat to cultural resources in the area of Ajo and Childs. State land holdings are too small and too inaccessible to factor in an analysis of the potential conversion to private lands. Ranching on BLM lands only poses a threat to cultural resources if projects involve earth moving, such as building new cattle tanks, are proposed for the public lands; however, the BLM would require a survey, and if needed, some form of data recovery. The Cabeza Prieta National Wildlife Refuge, although used as fly over space by the Air Force, sees little by way of threatening activity towards cultural resource. Lastly, the mission of the Organ Pipe National Monument is to protect its cultural resources. In general, the threat to cultural resources within the subarea can also be characterized as being minimal.

Sensitivity Zone:

While the resource threat is believed to be low, it would still be useful to know where cultural resources are located. So little of the subarea has been investigated, however, and the data that is available is so fragmented, that it is not possible to visually present site distribution in any meaningful manner. Site proximity to water is not even possible because the necessary analysis on stream ranking is not available. As such, the only reasonable way to predict where cultural resources may be located is to use vegetation maps showing the distribution of environmental zones that in the past have been attractive to human beings. The map entitled **GAP Vegetation and Archaeological Sites** shows the distribution of major vegetative zones within the subarea. There are basically two such zones: the Arizona Upland Subdivision of Sonoran Desertscrub characterized by Paloverde and mixed cactus, and the Lower Colorado River Valley Subdivision of the Sonora Desertscrub dominated by creosote and bursage. Recent research conducted for the Air Force by SWCA, Inc., in the Barry Goldwater Bombing range to the north of the subarea suggest that archaeological sites tend to be found in higher frequencies in upland settings that receive higher rainfall in association with the Palo Verde-cactus vegetative zone. This is because this vegetative zone is more productive of foods that are edible to human beings. If this correlation is applied to the subarea, then archaeological sites will tend to be found in the areas colored orange and less so in those areas colored light purple. Exceptions will include any place where water can be reliably found, such as along major washes and water holes, as well as along trails that criss-cross the valley bottoms.

V. SUMMARY: The cultural resources of the Western Pima County subarea are the product of thousands of years of human settlement from the earliest prehistoric times to the modern day. This report provides information on known cultural resources within the subarea describing their nature and attempts to predict where other cultural resources may be found. Clearly, more is known about the archaeological record than either historic resources or traditional cultural places. This is because more formal study has been directed to the archaeological record, whereas research on historic resources is limited, and ethnographic information on traditional cultural properties is almost completely lacking. It is also apparent that the subarea has received limited research attention over the years. While archaeological survey data are lacking it is evident that very little of the subarea has been formally surveyed and only a few sites have ever been excavated. To compound this problem, what data there are is fragmented between federal agencies with their own filing systems preventing comprehensive analysis. Despite these problems, this short review of the data suggests that up to 10,000 years of human history is represented in the subarea, and that the peak use of the subarea occurred during late prehistory when the region was occupied by people from three different culture groups. Historic uses of the subarea by Native Americans (O'odham) is evident as is use by Euro-Americans from

Spanish Colonial times to the modern day.

The historic communities of Ajo and Childs are products of mining and ranching respectively, both of which significantly contributed to the history of the subarea. The ghost towns of Clarkstown and Gunsight are further examples of 19th and early 20th century mining communities that historically were a part of the western mining phenomenon that has contributed so much to the building of the nation.

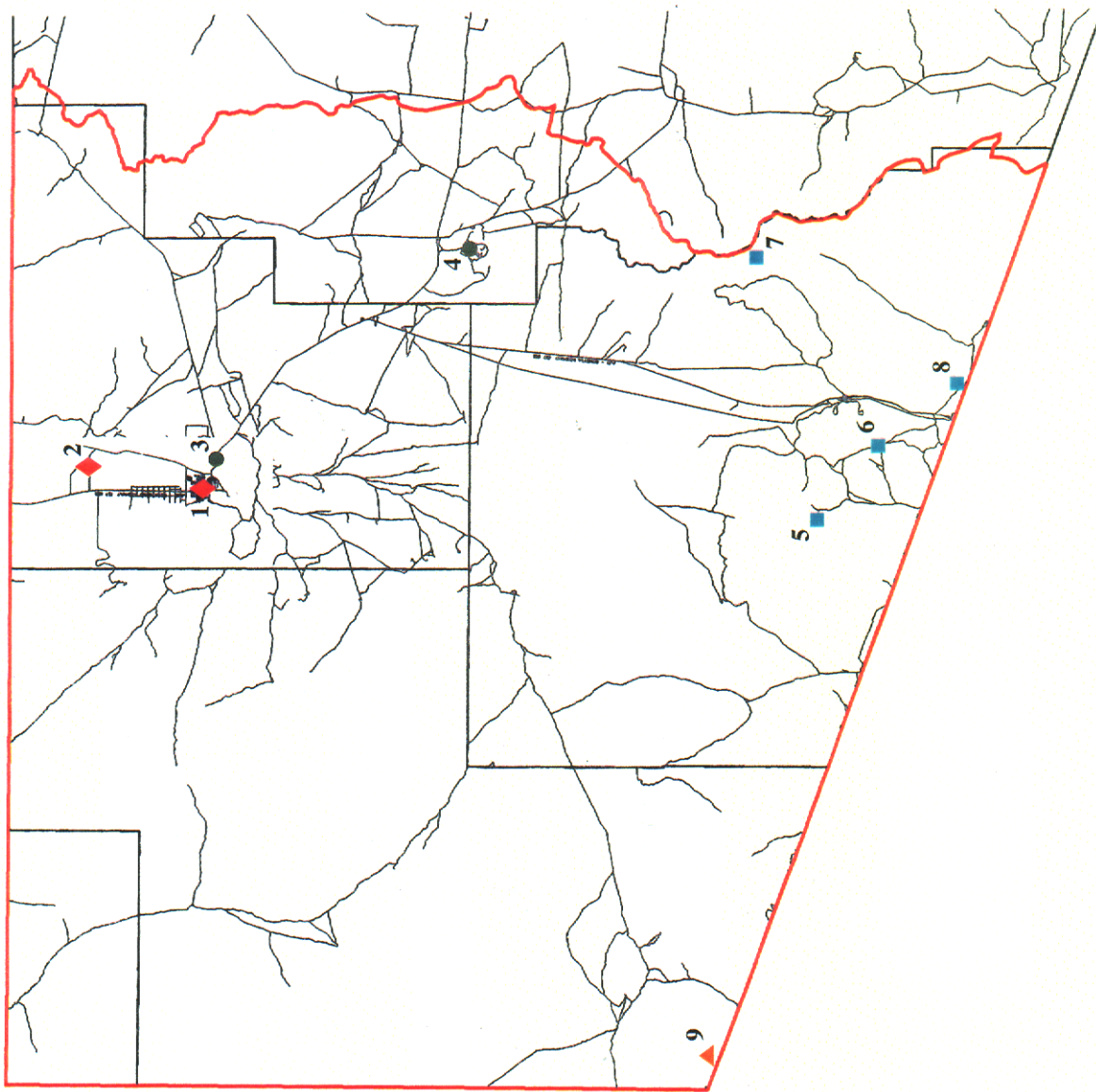
The subarea has eight places that are listed on the National Register of Historic Places, celebrating prehistoric settlement, Spanish Colonial exploration, 19th and 20th century mining and ranching. Lastly, Native American claims identify the subarea as part of their traditional home lands and two places with traditional cultural value to the Tohono O'odham are known to exist in the subarea.

In short, while still virtually unrecorded, the subarea has evidence of important cultural and historical resources with a high potential for many more such resources than are currently known. Since the majority of the Subarea is composed of federal lands and since the agencies that manage these lands are mandated by law to protect cultural resources, the potential threat of loss to cultural and historical resource overall is low in comparison to other subareas in Pima County. While mining and development of private land have the potential to impact the record of the past, that record is still largely intact within the western Pima County subarea.

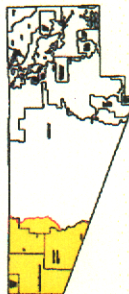
WESTERN PIMA COUNTY HISTORIC RESOURCES

SDCP PLANNING UNIT 8

- ◆ Historic Community
 - National Register Historic Places
 - Ghost Town
 - ▲ Trail
1. Ajo
 2. Childs
 3. Clarkstown
 4. Gunsight
 5. Milton Mine
 6. Victoria Mine
 7. Bull Pasture
 8. Gachado Well and Line Camp
 9. El Camino del Diablo



Pima County Index Map



Scale Map: 1:100,000

THE COUNTY OF PIMA, ARIZONA, HEREBY CERTIFIES THAT THE INFORMATION CONTAINED IN THIS MAP WAS OBTAINED FROM THE BEST AVAILABLE SOURCES AND THAT THE COUNTY OFFICIALS HAVE REVIEWED THE INFORMATION AND BELIEVE IT TO BE TRUE AND CORRECT. THE COUNTY OFFICIALS DO NOT WARRANT THE ACCURACY OF THE INFORMATION CONTAINED IN THIS MAP. THE COUNTY OFFICIALS DO NOT WARRANT THE ACCURACY OF THE INFORMATION CONTAINED IN THIS MAP.



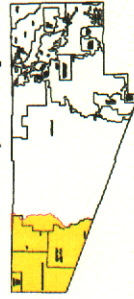
Pima County Technical Services
301 North Stone Avenue, 8th Floor
Tucson, Arizona 85701
Phone: 520-799-3429
Fax: 520-799-3430



GAP Vegetation and Archaeological Sites SDCP PLANNING UNIT 8

- Archaeological Sites
- Springs
- Watershed Planning Unit Boundary
- Administrative Boundary
- Wetlands
- Agriculture
- Urban
- Mining
- Chihuahuan Desertscrub (Creosotebush-Turkeyfoot)
- Chihuahuan Desertscrub (Mixed Scrub)
- Chihuahuan Desertscrub (Whitecholla)
- Madroño Evergreen Forest (Escorial)
- Madroño Evergreen Forest (Oak-Plum)
- Madroño Montane Oaklike Forest (Douglas-Fir-Mixed Oaklike)
- Madroño Montane Oaklike Forest (Pine)
- Mojolón Chaparral Scrubland (Amarantillo)
- Mojolón Chaparral Scrubland (Mixed Evergreen Sclerophyll)
- Mojolón Deciduous Swampforest (Cottonwood-Willow)
- Mojolón Deciduous Swampforest (Mixed Broadleaf)
- Playa
- Scrub Grassland (Mixed Grass-Scrub)
- Scrub Grassland (Succulent-Scrub)
- Sonoran Deciduous Swamp and Riparian Scrub (Mixed Scrub)
- Sonoran Desertscrub (Creosotebush-Banana)
- Sonoran Desertscrub (Palo Verde-Mixed Oak)
- Sonoran Desertscrub (Salsola)
- Sonoran Interior Marshland (Cattail)
- Sonoran Riparian and Oasis Forest (Cottonwood-Willow)
- Water

Pinna County Index Map



Index Map Scale: 1:100,000

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Scale 1:100,000

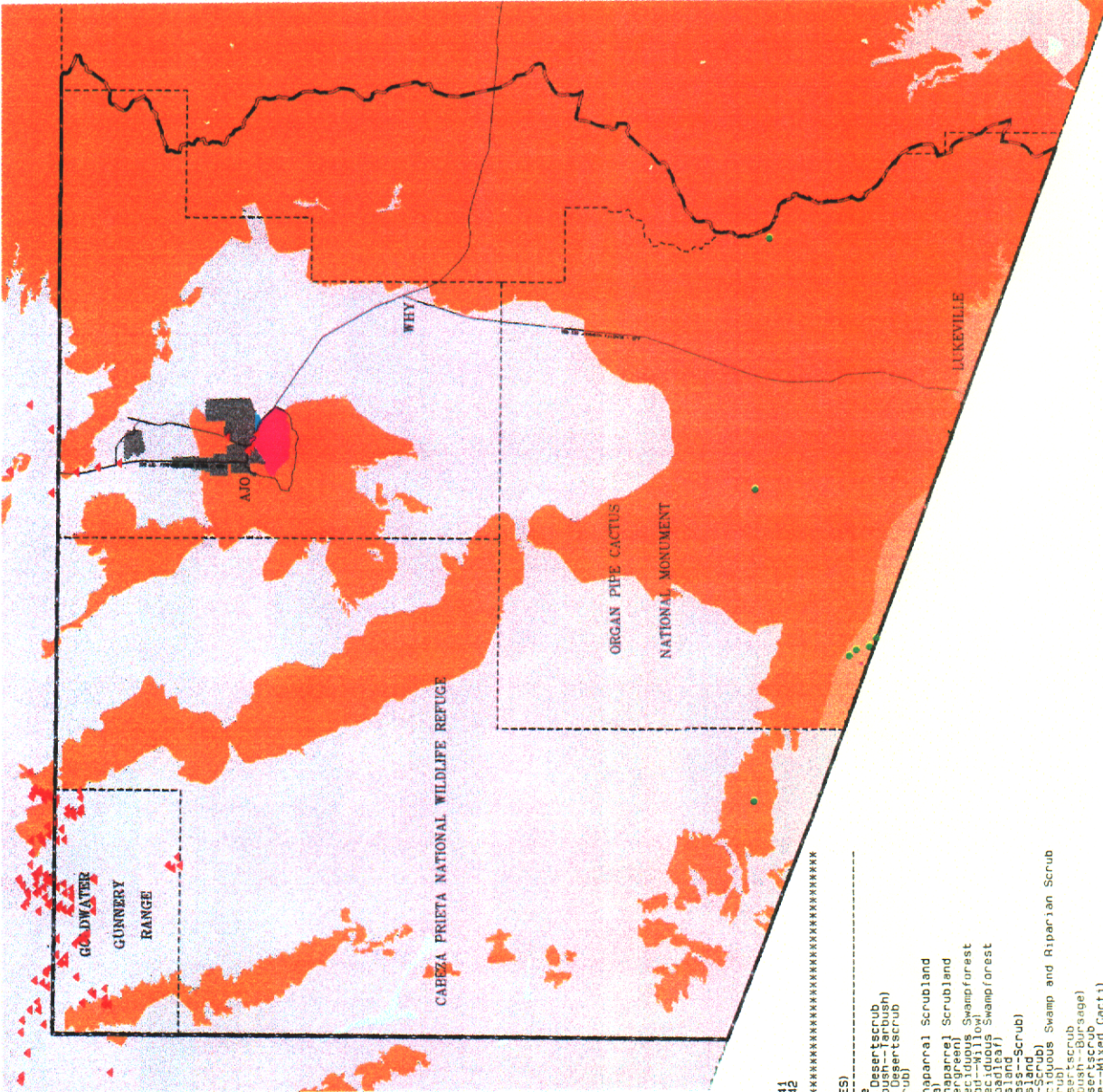
THE COUNTY DEPARTMENT OF TRANSPORTATION



Pinna County Technical Services
200 North Main Street, Suite 100
Pinna, Arizona 85645
Phone: (520) 437-7900-7900
http://www.dot.cc.pina.ariz.us



9/18/00



Minimum Elevation	Maximum Elevation	VEGETATION ACREAGE	BIOME (SERIES)
541	4,542	120	Grassland Desertscrub (Creosotebush-Turkeyfoot)
		0	Chihuahuan Desertscrub (Mixed Scrub)
		2,390	Mojolón Chaparral Scrubland (Mixed Evergreen)
		0	Mojolón Deciduous Swampforest (Mixed Broadleaf)
		0	Sonoran Desertscrub (Palo Verde-Mixed Oak)
		0	Sonoran Desertscrub (Salsola)
		542,271	Sonoran Desertscrub (Creosotebush-Banana)
		517,818	Sonoran Desertscrub (Palo Verde-Mixed Oak)
		11,094	Sonoran Desertscrub (Salsola)
		6	Sonoran Riparian and Oasis Forest (Cottonwood-Willow)
		5,838	Water
		2,020	Water
		2,837	Unclassified

□

Sonoran Desert Conservation Plan

Western Pima County Watershed Sub-area Report

Draft

Pima County

May 2000

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Draft

I. SUMMARY

The Western Pima County Watershed is located to the west of the Tohono O'odham Nation, extending to the Yuma County boundary. It encompasses an area of approximately 1,082,282 acres.

The watershed's land ownership is comprised almost entirely of Federal holdings. The remaining land is comprised of land under State, County and private ownership, and Indian Reservation land.

The watershed's land use is predominantly public reserves under Federal jurisdiction. The towns of Childs, Ajo, Why and Lukeville, on State Highway 85 account for most of the built areas. Approximately 1,185 acres account for single family residential, 3,417 acres industrial, 60 acres of commercial, 13,000 acres of military and 8,744 acres of agriculture. The planned land use applies to approximately 1,655 acres in the Ajo area, which include Suburban Ranch, CR Residential, Transitional, Trailer Homesite, Mobile homes, Industrial, and Commercial. Existing zoning on vacant land in the Ajo area is predominantly CI-2 General Industrial and CR-3 Single Residence. Vacant land with other zoning designations include CR-4 Mixed Dwelling Type, Mobile Homes and some Transitional areas. There are several old rezoning cases, dating as far back as the early 1960s, involving 142.67 acres with a total of 2,570 proposed lots. Some of these have conditional zoning.

The watershed's topography is composed of peaks/ridges and wide valleys/ expanses of land. The peaks/ridges and mountain ranges vary in altitude between 700 and 1,400 meters above the mean sea level (MSL). The valleys vary in altitude between 350 and 450 meters above MSL.

The Organ Pipe Cactus National Monument and the Cabeza Prieta National Wildlife Refuge and Wilderness Area are the major public reserves. The mountain ranges in the watershed include the Bates, Batamote, Childs, Cipriano Hills, Diablo, Granite, Growler, Little Ajo, Puerto Blanco, Redondo Pozo, Sonoyta, part of the Ajo Range. The corresponding valleys are Childs Valley, La Abra Plain, Sonoyta Valley and the southern portion of the Valley of the Ajo. Some of the washes are Growler, San Cristobal, Ten Mile, Daniels Arroyo, Cuerda de Leña, Kuakatch and Alamo.

The viewsheds in the Western Pima County watershed is predominantly un-built with very pristine viewsheds. The Organ Pipe Cactus National Monument, public reserves and a general lack of building activities offer unbridled panoramic views.

The full cash value of unplatted land in Ajo is \$1,698 per acre, in comparison with the value of platted land at \$81,138 per acre. Only four percent of Ajo's land is platted, which puts the average value of land (platted and unplatted) at \$5,056 per acre.

Approximately \$550,000 are currently tied to capital improvement projects in the watershed.

Permitting activities, residential and commercial, are relatively insignificant, reflecting a low level of building activities in the watershed.

II. SITE INVENTORY AND ANALYSIS

A. Location

The Western Pima County Watershed sub-area is to the west of the Tohono O'odham Nation, geographically referenced between Township 11 - 18 South and Range 3 - 10 West. Maricopa County is to its north, Yuma County to its west and Mexico to its south. The watershed encompasses an area of approximately 1,082,282 acres.¹

B. Ownership

The watershed's land ownership is comprised almost entirely of Federal holdings, namely the U.S. Fish and Wildlife Service (40 percent), National Park Service (30 percent) and Bureau of Land Management (17 percent). The remaining land is comprised of land under State, County and private ownership, and Indian Reservation land.

C. Land Use and Zoning

1. Land Use

The watershed's land use is predominantly public reserves under Federal jurisdiction. The towns of Childs, Ajo, Why and Lukeville, on State Highway 85 account for most of the built areas in the watershed, other than the military operations in the Cabeza Prieta National Wildlife Refuge and smaller settlements such as Bates Well, Chico Shune and Gibson. **Table 1** shows the existing land use.

The towns of Ajo and Why reflect a range of land uses. Ajo, which progressed into a town from a mining camp of the late 1800s, is built upon a grid. The residential areas west of Well Road No. 1 have been built at fairly high densities of residences per acre. The northern part of Town, on both east and west of State Highway 85 reflect lower densities.

Within the watershed, approximately 1,185 acres or 1.9 square miles (1.1 percent of the watershed) have been developed as single family residential use with densities ranging from 0.2 RAC to 25 RAC. Industrial land use (primarily the New Cornelia Mine, south and east of downtown Ajo) accounts for about 3,417 acres and commercial uses equals 60 acres. Other significant uses include Military (approximately 13,000 acres) and Agriculture (8,744 acres).

Ranching and ranch conservation in Western Pima County is considerably limited, compared to the other watersheds. Grazing on public land is limited to land owned by BLM. In the Western Pima County watershed there are five ranches, namely, Childs, Coyote Flat, Cameron, Why and ASLD-SLUP. These include one State Trust Land grazing site, one State grazing permit and four BLM leases.² These uses are carried out on approximately 175,572 acres (16.22 percent) of the total watershed land area. Private land used for grazing is an insignificant seven acres.

Table 1

EXISTING LAND USE - WESTERN PIMA COUNTY WATERSHED

LAND USE	JURISDICTION	ACRES
RURAL	PIMA COUNTY	654.70
0.2 TO 0.4 RAC	PIMA COUNTY	321.28
0.4 TO 0.75 RAC	PIMA COUNTY	182.73
0.75 TO 1.25 RAC	PIMA COUNTY	122.39
1.25 TO 3.0 RAC	PIMA COUNTY	168.81
3.0 TO 6.0 RAC	PIMA COUNTY	135.99
6.0 TO 10.0 RAC	PIMA COUNTY	128.16
10.0 TO 15.0 RAC	PIMA COUNTY	114.73
15.0 TO 25 RAC	PIMA COUNTY	10.50
AGRICULTURAL	PIMA COUNTY	8,743.56
COMMERCIAL	PIMA COUNTY	60.43
OFFICE	PIMA COUNTY	1.99
INSTITUTIONAL	PIMA COUNTY	60.89
INDUSTRIAL	PIMA COUNTY	3,416.63
LODGING	PIMA COUNTY	35.25
MILITARY	PIMA COUNTY	12,952.20
MISC GOVERNMENT	PIMA COUNTY	702.23
OTHER	PIMA COUNTY	33.80
PUBLIC PRESERVE	PIMA COUNTY	793,892.62
UTIL/TELECOMM	PIMA COUNTY	122.14
VACANT	PIMA COUNTY	38,836.22
VACANT-JUR	PIMA COUNTY	246,375.46
CHK	PIMA COUNTY	11,621.11
TOTAL (WESTERN PIMA COUNTY)		1,118,693.82

TOHONO O'ODHAM NATION: 2,368,591.66

PERCENT OF AGRICULTURAL IN RANCHING AND GRAZING: 93% (8084 ACRES)

2. Planned Land Use

The planned land use applies to approximately 1,655 acres of land in the Ajo area, which include Suburban Ranch (36.3 percent); CR Residential (36.8 percent); Transitional (6.6 percent); Trailer Homesite (4.5 percent); Mobile homes; Industrial (8.0 percent); and, Commercial (7.1 percent), as shown in **Table 2**.

Table 2

**PLANNED LAND USE ON VACANT LAND - AJO AREA PLAN
UNINCORPORATED PIMA COUNTY**

PLANNED LAND USE	ACRES
SR Suburban Ranch	599.74
CR-1 Single Residence	297.10
CR-2 Single Residence	101.66
CR-3 Single Residence	45.09
CR-4 Mixed Dwelling Type	114.01
CR-5 Multiple Residence	51.95
CMH-1 Mobile Home - 1	9.40
TH Trailer Homesite	75.20
TR Transitional	108.67
CB-1 Local Business	38.21
CB-2 General Business	80.15
CI-1 Light Industrial/Warehouse	2.55
CI-2 General Industrial	130.76
TOTAL	1,654.49

3. Zoning

Existing zoning on vacant land in the Ajo area is predominantly CI-2 General Industrial and CR-3 Single Residence. Vacant land with other zoning designations include CR-4 Mixed Dwelling Type, Mobile Homes and some Transitional areas.

In the Town of Why, existing zoning is comprised of RH Rural Homestead and commercial at the intersection of State Highways 85 and 86. There are a couple of mobile home districts toward the northern part of Town. A mile south of Town on U.S. Highway 86, there is a 160-acre portion of Trailer Homesite district. Zoning on vacant land in the Why area is

Currently, an area of approximately 79,456 acres are vacant with zoning designations, of which, a large portion is zoned RH Rural Homestead i.e. land earmarked for low-density residential uses. Vacant land with Industrial use (General and Heavy) designation totals about 758 acres and commercial vacant land measures less than 60 acres.

Table 3

**ZONING ON VACANT LAND - WESTERN PIMA COUNTY WATERSHED
UNINCORPORATED PIMA COUNTY**

ZONING DISTRICT	ACRES
IR Institutional Reserve	15,529.34
RH Rural Homestead	40,509.88
GR-1 Rural Residential	129.03
CR-3 Single Residence	957.26
CR-4 Mixed Dwelling Type	451.95
CR-5 Multiple Residence	43.01
SH Suburban Homestead	401.90
CMH-2 Mobile Home - 2	62.18
TH Trailer Homesite	180.74
TR Transitional	39.15
CB-1 Local Business	5.24
CB-2 General Business	102.40
CI-1 Light Industrial/Warehouse	11.52
CI-2 General Industrial	3,499.34
TOTAL	61,922.94

There are several rezoning cases that are either being reviewed currently or have been left open from as far back as the early 1960s. Some of these have conditional zoning while others do not. **Table 4** lists the cases related to residential rezonings, showing that 142.67 acres are under such consideration affecting a total of 2,570 proposed lots.

Table 4

CASE NO.	TO	FROM	ACRES	NO. OF LOTS	CONDITIONAL	T-R-S	BASEMAP
Co9-93-57	TH	RH	10	217	YES	14-05-01	WPC
Co9-65-49	TH	GR	22	479	YES	18-05-06	WPC
Co9-65-43	TH	GR	24.65	536	YES	18-05-07	WPC
Co9-67-38	TH	CR-4, SH	30	653	YES	12-06-15	A-1, A-2
Co9-98-06	CMH-2	CR-3 CI-1	54.53	672	YES	12-06-14	A-1, A-8
Co9-95-57	CMH-1	CR-4	2.49	13	YES	12-06-22	A-1
TOTAL			143.67	2,570			

D. Topography

The Western Pima County watershed's topography is composed of peaks/ridges and wide valleys/expanses of land. The peaks/ridges and mountain ranges vary in altitude between 700 and 1,400 meters above the mean sea level (MSL). The valleys vary in altitude between 350 and 450 meters above MSL.

The Organ Pipe Cactus National Monument lies on the south-eastern part of Western Pima County sharing its eastern boundary with the Tohono O'odham Nation. This National Park Service jurisdiction includes the Bates Mountains, Cipriano Hills, Diablo Mountains, Puerto Blanco Mountains, Sonoyta Mountains and part of the Ajo Range. The corresponding valleys are La Abra Plain, Sonoyta Valley and the southern portion of the Valley of the Ajo.

The Cabeza Prieta National Wildlife Refuge and Wilderness Area lie in Pima and Yuma Counties, on land under the jurisdiction of the U.S. Fish and Wildlife Service. Within Pima County, the wildlife refuge includes the Granite Mountains, Growler Mountains and Childs Mountain. The corresponding valleys are Growler Valley (between Granite and Growler Mountains) and the southern portion of the Childs Valley (between Growler and Childs).

The BLM land, in the north-eastern part of Western Pima County, surrounding the towns of Ajo and Why, includes the Batamote Mountains, Little Ajo Mountains and the northern portion of the Redondo Pozo Mountains. The corresponding plains are the Valley of the Ajo (northern portion) and the low-lying areas of the Ten Mile Wash.

There are several washes which include Growler, San Cristobal, Ten Mile, Daniels Arroyo, Cuerda de Leña, Kuakatch, Sikort Chuapo, Alamo and Aguajita.

E. Hydrology

In Pima County, the water problems evident today stem from historic issues of: serious overdraft of an aquifer due to continued groundwater mining; the failure to understand the interconnection between surface and ground water; and "the continued strategies within the community to defer reconciliation of water use with water availability."³ These in turn have given rise to "the loss of 85 to 95% of quality riparian habitat during the last century,..."⁴

It is evident that "the jurisdictions throughout the region face the realistic prospect that a level of restoration will be a condition of the Section 10 permit issued under the Endangered Species Act."⁵

The perennial and intermittent stream reaches identified in *GIS Coverages of Perennial and Intermittent Streams, and Areas of Shallow Groundwater* have no data for the watershed.

F. Soils

For soil information, please contact Department of Environmental Quality (DEQ)

G. Environmental Characteristics

1. Vegetation

The watershed is documented to have the following flora based on the Gap Analysis Program (GAP). The Gap Analysis Program is “a national endeavor to catalog the range of vertebrates or their habitat (based on vegetation) in every state and compare them to land ownership.”⁶

The vegetation types include Sonoran Desertscrub (Saltbush), Sonoran Desertscrub (Paloverde - Mixed Cacti) and Sonoran Desertscrub (Creosotebush - Bursage).⁷ Some vegetation types are unclassified in the GAP/EROS maps.

There are continued mining activities in the Ajo area.

2. Wildlife

Please refer to the report on Biological Resource Base and *Water Resources and the Sonoran Desert Conservation Plan*, July 1999.

H. Viewsheds

The Western Pima County watershed is predominantly un-built with very pristine viewsheds. The Organ Pipe Cactus National Monument, public reserves and a general lack of building activities offer unbridled panoramic views.

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Plate I (above): Growler Mountains (looking south from five miles north of downtown Ajo)



Plate II (above): Batamote Mountains (looking north-east from 2.5 miles east of downtown Ajo)

Plate III (below): Pozo Redondo Mountains (looking south-east from 2.5 miles east of downtown Ajo)

Draft





Plate IV (above): Batamote Mountains (looking north-east from 2.5 miles east of downtown Ajo)

Plate V (below): Pozo Redondo Mountains (looking south-east from 2.5 miles east of downtown Ajo)





Plate VI (above): Town of Ajo (looking north-east from south of Town, Batamote Mntns. in background)

Plate VII (below): Downtown Ajo (looking east from west of Downtown Square)





Plate VIII (above): School, Downtown Ajo (looking west from Square, Camelback Mountain in background)

Plate IX (below): Downtown Ajo (looking east from west of Downtown Square)



I. Infrastructure

The major areas of development within the watershed are Ajo, Why and Lukeville.

1. Roads and Access

Within this watershed, the major routes are State Highways 86 (Ajo Highway) and Hwy. 85 (Gila Bend to Lukeville through Ajo and Why). These routes are designated Major Streets and Scenic Routes since they are state highways, entailing special zoning regulations for abutting development. There is also Hwy.15 connecting Hwy 86 (between Sells and Why) to the Casa Grande area and Hwy.19 linking Sells and San Miguel. There are several other important routes throughout the Tohono O'Odham Nation.

2. Water

This watershed lies to the west of the Department of Water Resources Tucson Active Management Area. The Ajo Improvement Company (a division of Phelps Dodge Corporation) serves the Ajo area. The Why Utility Company provides water to the Why community. Outside of the areas served by water companies, private wells are used.

3. Sanitary sewer

The public sanitary sewerage conveyance and treatment facilities in Pima County are owned and operated by the Wastewater Management Department (WWM). WWM is an enterprise fund and is not supported by the tax base.

Some developments have the need for sewers. The developer bears all responsibility to build such sewers to serve a development, and pays for the construction of all sewers, whether they are public or private, on-site or off-site. If the sewers are public, the developer builds and transfers ownership to WWM, subject to acceptance by WWM.

The cost to WWM for the operation, maintenance and replacement of conveyance lines is paid for by the monthly User Fees. These fees also pay for the treatment costs. The cost to WWM for treatment facility expansion and large line (trunk or interceptor) construction or augmentation are paid for by the one-time Sewer Connection Fees.

The sanitary sewer system in the Town of Ajo is owned and operated by the Ajo Improvement Company. Pima County does not own any sewers or treatment facilities in that area.

4. Telephone and Electricity

U.S. West Communications serves western Pima County. Table Top Telephone Company provides service to the Ajo area including Lukeville and Why, as well as to Seligman, Bagdad, Sanders, and Aguila. The Ajo Improvement Company (a division of Phelps Dodge Corporation) offers electrical service to the Ajo area.

5. Natural Gas

Southwest Gas Company serves the Ajo community. Since much of this watershed is very rural, many residents use private, propane tanks.

6. Schools

The following school districts overlay this watershed:

- a. Ajo Unified District entails the western part of the watershed and has one combined elementary/junior/high school.
- b. Altar Valley S.D. covers the southeastern portion of the watershed and has a middle and elementary school in Three Points.
- c. Indian Oasis & Baboquivari S.D. covers the San Xavier District of Tohono O’Odham Nation. The school district has a primary, middle, and an alternative and standard high school in Sells, an intermediate school in Topawa, and a preschool handicapped Head Start in Sells.
- d. Marana Unified S.D. overlays a northern portion of the watershed. This district has nine elementary schools, four middle schools, and two high schools.

7. Parks

The Western Pima County parks and recreational facilities are located in the Ajo area:

- a. Ajo Regional Park
- b. E.W. “Bud” Walker Neighborhood Park
- c. Gibson Neighborhood Park
- d. Palo Verde Neighborhood Park.

J. Open Space

The primary open spaces in the watershed are the reserves, as shown in **Table 5**. Studies were done where “reserve boundaries were verified by land managers,”⁸

Table 5

	RESERVE	GAP STATUS	ACRES	LOCATION
1.	Cabeza Prieta National Wildlife Refuge	1-b	56,592	Western Pima County
	Cabeza Prieta Wilderness Area	1-a	373,158	
2.	Organ Pipe Cactus National Monument	2	3,518	Western Pima County
	Organ Pipe Cactus Wilderness Area	1-a	314,883	
3.	Goldwater Gunnery Range	N/A	46,080	W. Pima Co.
	TOTAL		794,231	

The combined total of the reserves account for about 794,231 acres (73.4 percent) of the total land area in the watershed. The Gap Analysis Program's status of protection for each public reserve is also shown in **Table 5**.⁹

K. Archaeological and Cultural Resources

Please refer to *Pima County's Cultural and Historic Resources Report*.

L. Real Estate Market Conditions

"The Pima County property tax base has declined substantially during the last quarter century when viewed on a per capita basis. The general fiscal trends show a decline in the revenue base."¹⁰

There is a considerable amount of unregulated development in the Ajo and Why areas with fair number of mobile homes. In terms of contribution to the County's tax base, "since 1977-78, there has been a 38 percent drop in the primary property tax value and a 36 percent drop in secondary value. To compensate for this declining tax base, the tax rate is increased with regulated development subsidizing the cost of providing services to unregulated areas."¹¹

The watershed has one (Ajo) of the sixteen urbanizing areas in Pima County.¹² In terms of infrastructure and fiscal strength, the full cash value of unplatted land in Ajo is \$1,698 per acre, in comparison with the value of platted land at \$81,138 per acre.¹³ Only four percent of Ajo's land is platted, which puts the average value of land (platted and unplatted) at \$5,056 per acre. It can be said that "the basic reason for this disparity is that unregulated development offers little in the way of sewers and roads, and the major housing type in unregulated areas has a valuation method which assumes depreciation over time, but improvements are the bulwark of the tax base."¹⁴

M. Capital Improvement Projects (by Departments)

Parks and Recreation

Ajo Pool Renovations (General Obligation Bond No. P-02)	\$152,970
---	-----------

Transportation

Ajo Airport Access Road/Taxiway Paving (General Fund, ADOT Aviation, Partially Unfunded)	\$391,000
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ARCHIVED:

Ajo Airport Perimeter Fencing
Ajo Airport Master Plan

UNFUNDED PROJECTS:

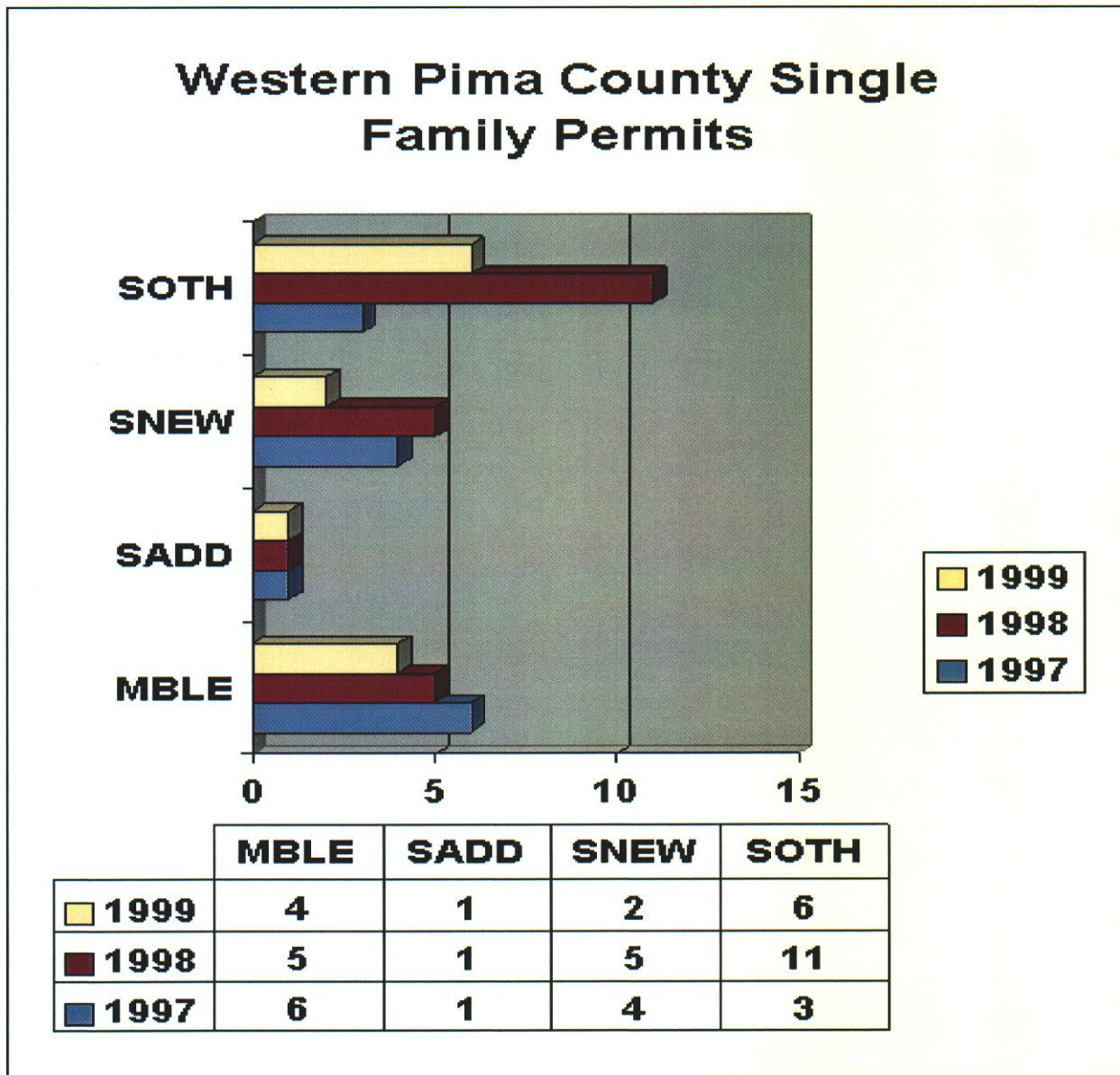
Ajo Airport Pavement Preservation
Ajo Municipal Surface Roadway

N. Permits

Permits issued for residential and commercial activities, between 1997 and 1999, are shown in **Graph 1** and **Graph 2** respectively.

Graph 1 shows that the total number of permits issued was the highest in 1998 (22 permits), with five each for single family residences and mobile homes. As the graph reveals, not too much permitting activities occur in this area.

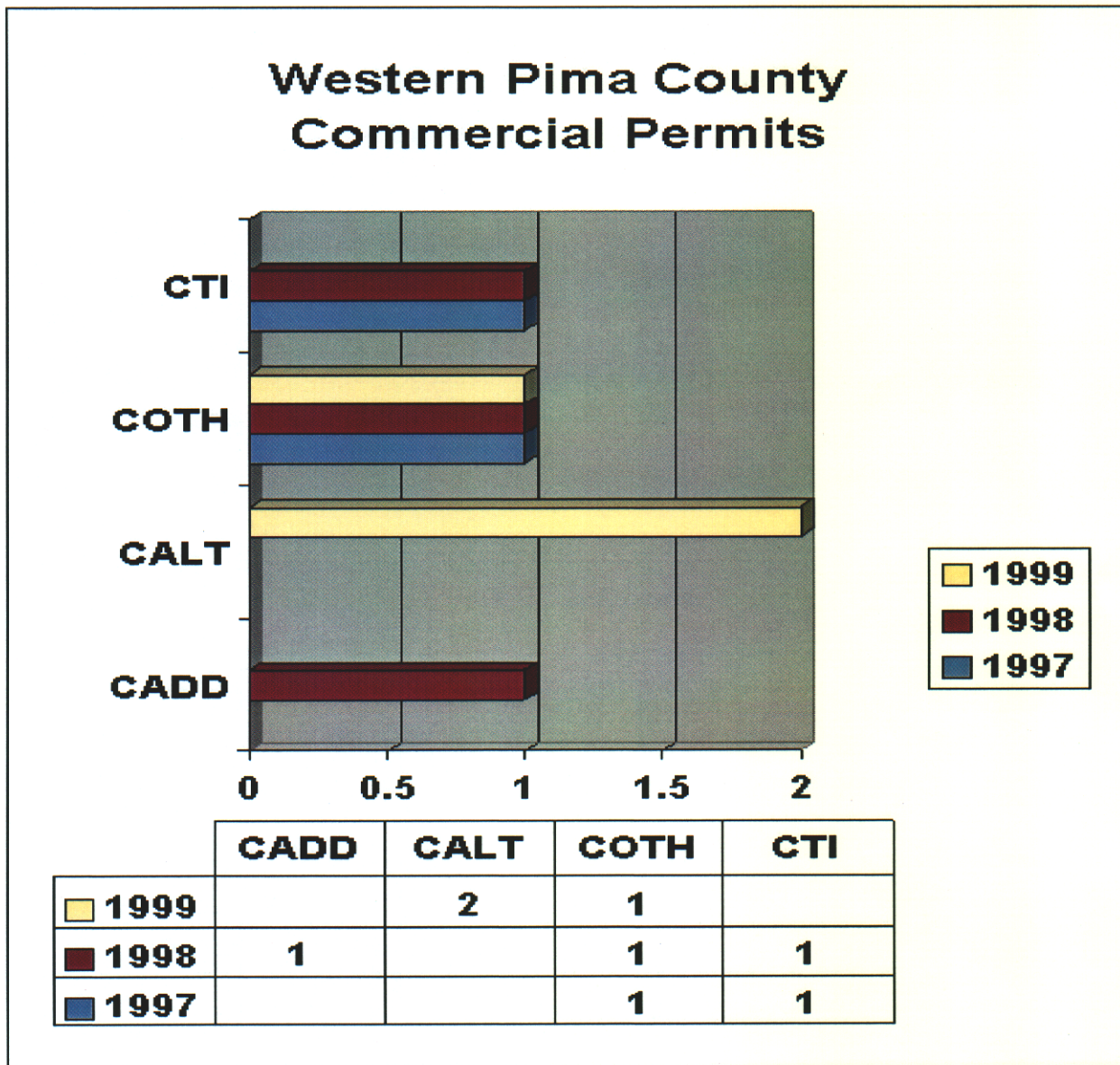
Graph 1



SOTH = SINGLE FAMILY (OTHER); SNEW = NEW SINGLE FAMILY; SALT = SINGLE FAMILY ALTERATIONS; SADD = SINGLE FAMILY ADDITIONS; MBL = MOBILE HOMES

Graph 2 reveals that the number of commercial permits issued within the watershed is absolutely negligible with two in 1997, three each in 1998 and 1999.

Graph 2



CADD = COMMERCIAL ADDITIONS; CALT = COMMERCIAL ALTERATIONS; CNEW = NEW COMMERCIAL; COTH=COMMERCIAL (OTHER); CTI=COMMERCIAL TENANT IMPROVEMENT

APPENDICES

Maps:

1. Map of Existing Land Use (Ajo-Why area)
2. Map of Existing Zoning on Vacant Land (Ajo-Why area)
3. Map of Planned Land Use on Vacant Land (Ajo-Why area)
4. Map of Committed Land (Ajo-Why area)
5. Map of Approved and Proposed Subdivisions on Vacant Land (Ajo-Why area)

Draft
































EXISTING LAND USE

Ajo-Why Area






15-MAR-2000

Legend

Existing Land Use

 VACANT	 INDUSTRIAL
 RURAL	 INSTITUTIONAL
 0.2 TO 0.4 RAC	 MISC. GOVERNMENT
 0.4 TO 0.75 RAC	 TRANSPORT FACIL
 0.75 TO 1.25 RAC	 UTILITIES/TELECOMMUNICATIONS
 1.25 RAC TO 3.0 RAC	 PARK
 3.0 TO 6.0 RAC	 GOLF COURSE
 6.0 TO 10.0 RAC	 AGRICULTURE
 10.0 TO 15.0 RAC	 DEDICATED OPEN SPACE
 15.0 TO 25.0 RAC	 OTHER
 GREATER THAN 25 RAC	 MILITARY/ST. POLICE
 LODGING	 VACANT-STATE
 RESORT	 VACANT-JURISDICTION
 OFFICE	 PARTIALLY DEVELOPED
 COMMERCIAL	 NO DATA
 ROADS/PVT STREETS	

Basemap Features

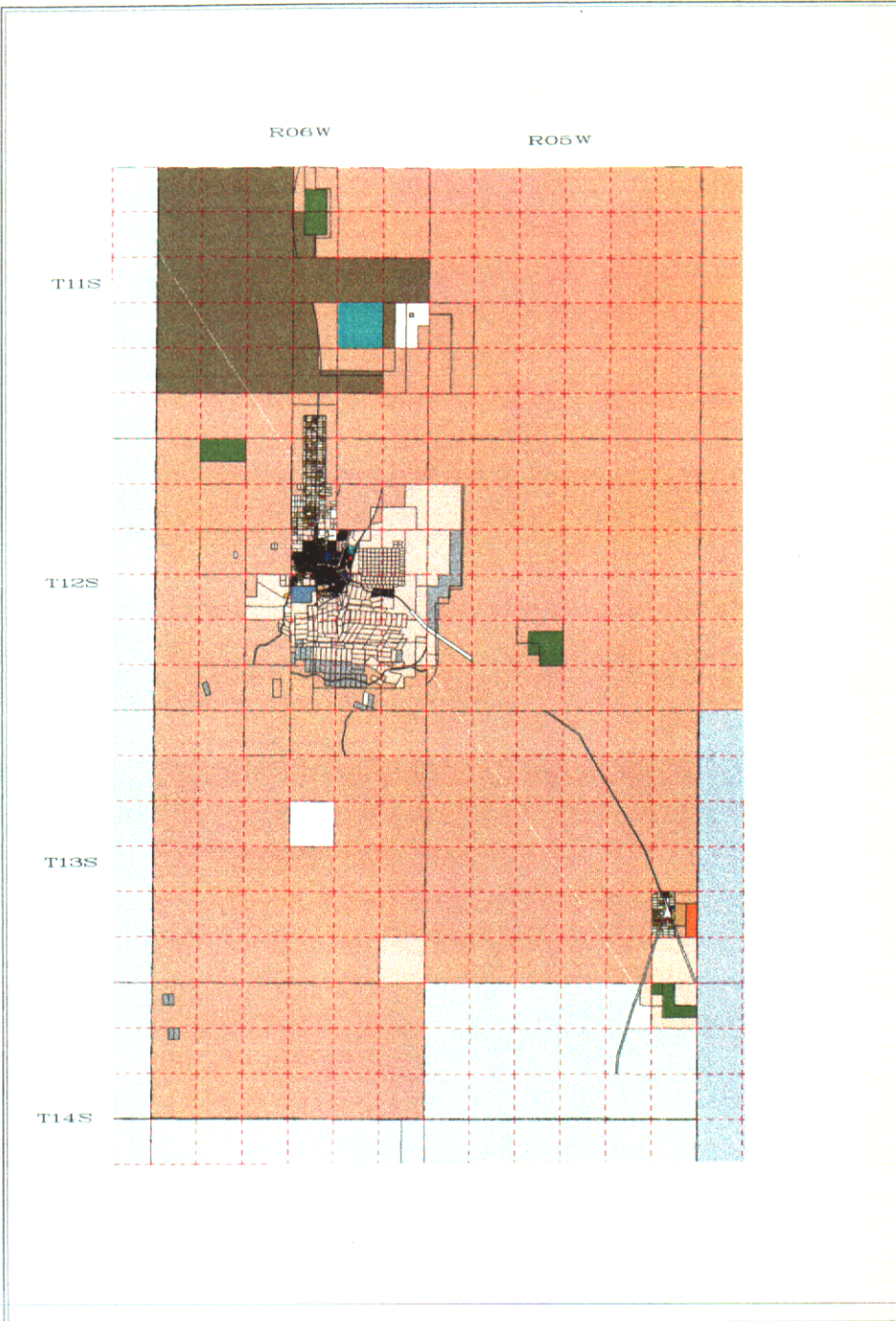
 Public Preserves	 Public Preserve Boundary
 Tribal Lands	 City and Town Limits
	 Sections



This map is regional in nature. Data comes from many sources, including the Pima County Development Services Dept., Dept. of Transportation and the Pima County Assessor's Office.



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EXISTING ZONING ON VACANT LAND

Unincorporated Pima County

Ajo-Why Area

15-MAR-2000

Legend

Zoning Districts

IR Institutional Reserve	CMH-2 Mobile Home-2
RH Rural Homestead	TH Trailer Homesite
GR-1 Rural Residential	MU Multiple Use
SR Suburban Ranch	MR Major Resort
SR-2 Suburban Ranch Estate	RVC Rural Village Center
SH Suburban Homestead	CB-1 Local Business
CR-1 Single Residence	CB-2 General Business
CR-2 Single Residence	CPI Campus Park Industrial
CR-3 Single Residence	CI-1 Light Industrial/Warehouse
CR-4 Mixed Dwelling Type	CI-2 General Industrial
CR-5 Multiple Residence	CI-3 Heavy Industrial
TR Transitional	SP Specific Plan
CMH-1 Mobile Home 1	GC Golf Course
Cond'l Zoning Boundary	

Basemap Features

Built or Committed Land	Public Preserve Boundary
Cities and Towns	Public Preserves
Sections	Tribal Lands
	Ranching or Grazing Land

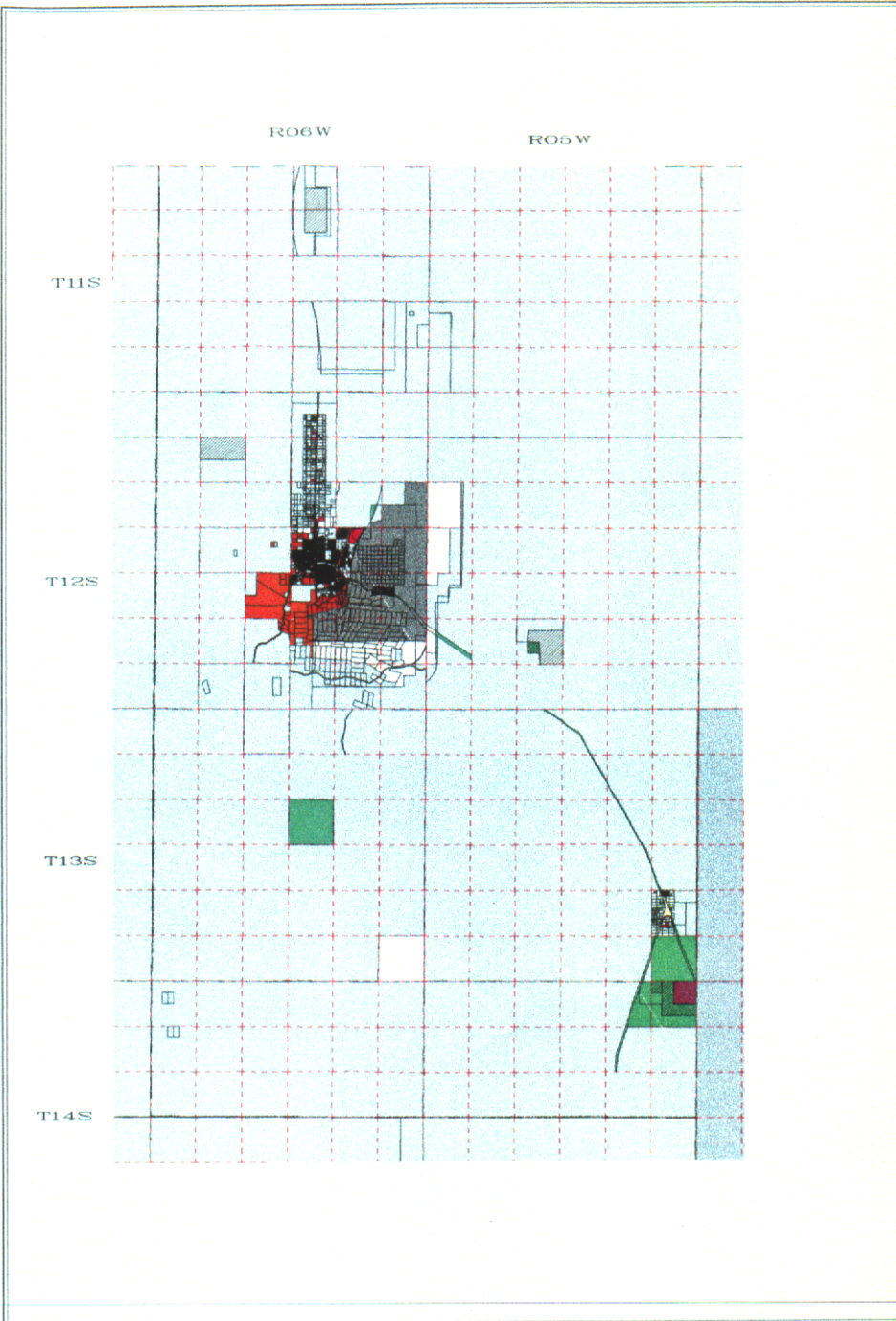
Note: Vacant land shown by plan designation color



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PLANNED LAND USE ON VACANT LAND

Unincorporated Pima County

Ajo Area Plan

16-MAR-2000

Legend

Planned Land Use

	SR Suburban Ranch		CB-1 Local Business
	CR-2 Single Residence		CB-2 General Business
	CR-3 Single Residence		CI-1 Light Industrial/Warehouse
	CR-4 Mixed Dwelling Type		CI-2 General Industrial
	CR-5 Multiple Residence		Proposed Sanitary Site
	TR Transitional		Proposed Park
	CMH-1 Mobile Home 1		Proposed Schools
	TH Trailer Home site		

Basemap Features

	Built or Committed Land		Public Preserve Boundary
	Ranching or Grazing Land		Public Preserves
	Sections		Tribal Lands

Note: Vacant land shown by plan designation color



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COMMITTED LANDS

Unincorporated Pima County

Ajo-Why Area

20-MAR-2000

Legend

Land Status

-  Built or Committed Land
- Categories of Vacant Land**
-  Rural Zoning
-  Rural Zoning-Subdivision or Development Plan Applied For
-  Rural Zoning-Approved Subdivision or Development Plan
-  0.3-1.0 RAC Equivalent Zoning
-  0.3-1.0 RAC-Subdivision or Development Plan Applied For
-  0.3-1.0 RAC-Approved Subdivision or Development Plan
-  1.0-3.0 RAC Equivalent Zoning
-  1.0-3.0 RAC-Subdivision or Development Plan Applied For
-  1.0-3.0 RAC-Approved Subdivision or Development Plan
-  3.0+ RAC Equivalent Zoning
-  3.0+ RAC-Subdivision or Development Plan Applied For
-  3.0+ RAC-Approved Subdivision or Development Plan

Basemap Features

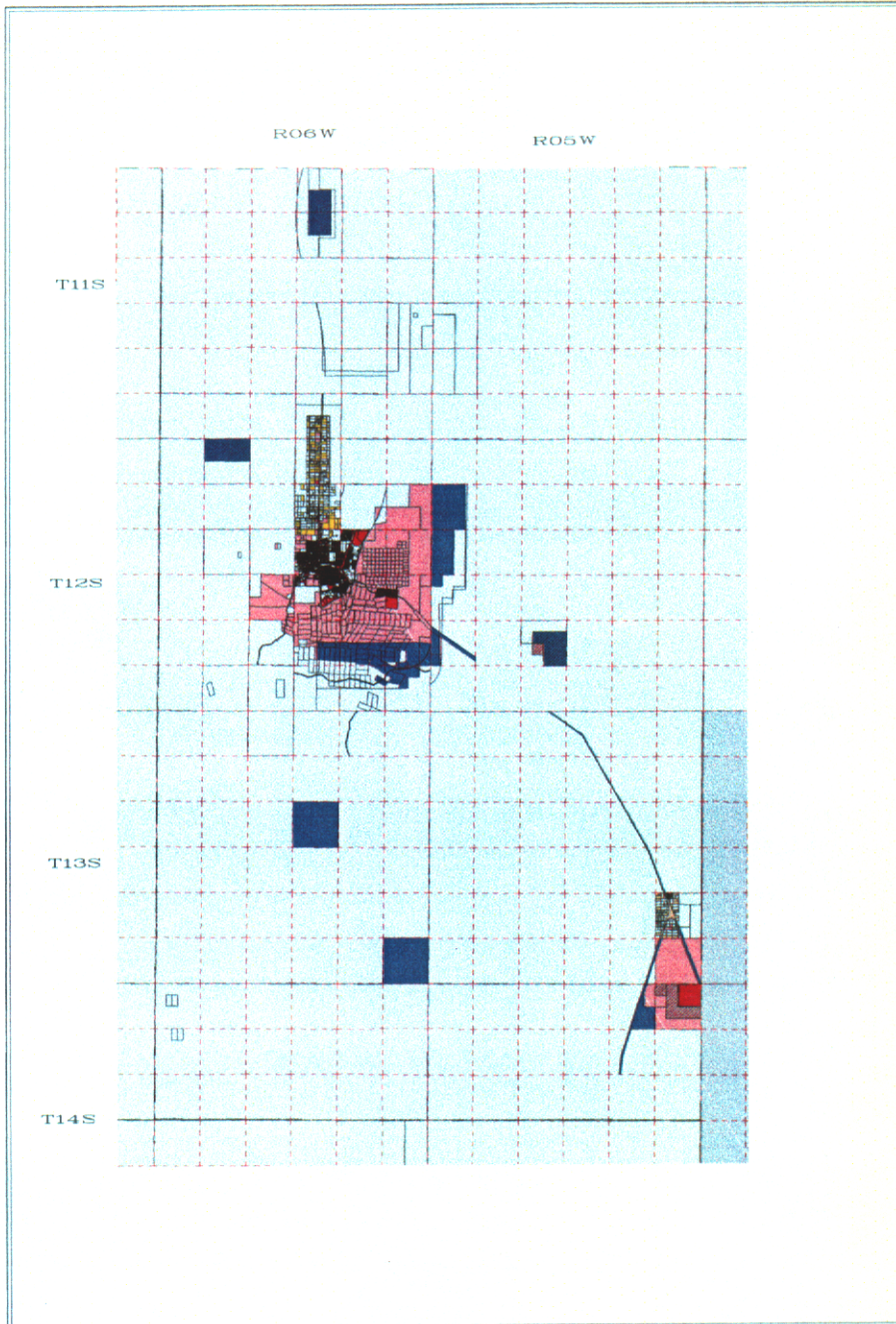
-  Cities and Towns
-  Tribal Lands
-  Sections
-  Public Preserve Boundary
-  Public Preserves
-  Ranching or Grazing Land



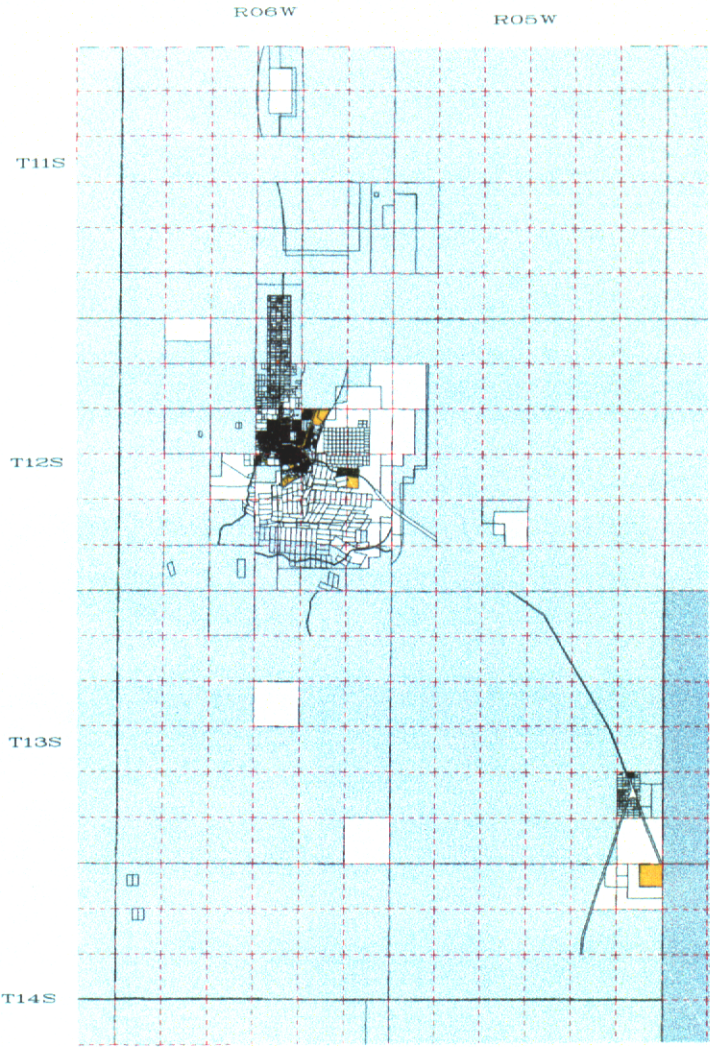
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**APPROVED AND PROPOSED
SUBDIVISIONS
ON VACANT LAND
Ajo-Why Area
22-MAR-2000**



Legend

- Approved Subdivisions or Development Plans
- Proposed Subdivisions or Development Plans

Basemap Features

- Built or Committed Land
- Public Preserve Boundary
- City and Town Limits
- Public Preserves
- Sections
- Tribal Lands



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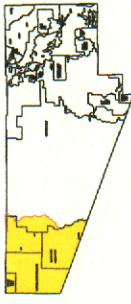
Platted Subdivisions

SDCP PLANNING UNIT 8

- Planning Unit Boundary
- Major Washes
- Parcel Lines
- Platted Subdivisions
- BLM
- County Park
- Indian Lands
- Military Reservations
- National Forest Lands
- National Parks and Monuments
- National Wildlife Refuge
- Private Lands
- State Lands
- State Park
- Ranch Use
- Goldwater Guntery Range

STATISTICS FOR UNIT 8
 NUMBER OF PLATTED SUBDIVISIONS: 34
 ACRES OF PLATTED SUBDIVISIONS: 961
 NUMBER OF PARCELS: 3,184

Pinna County Index Map



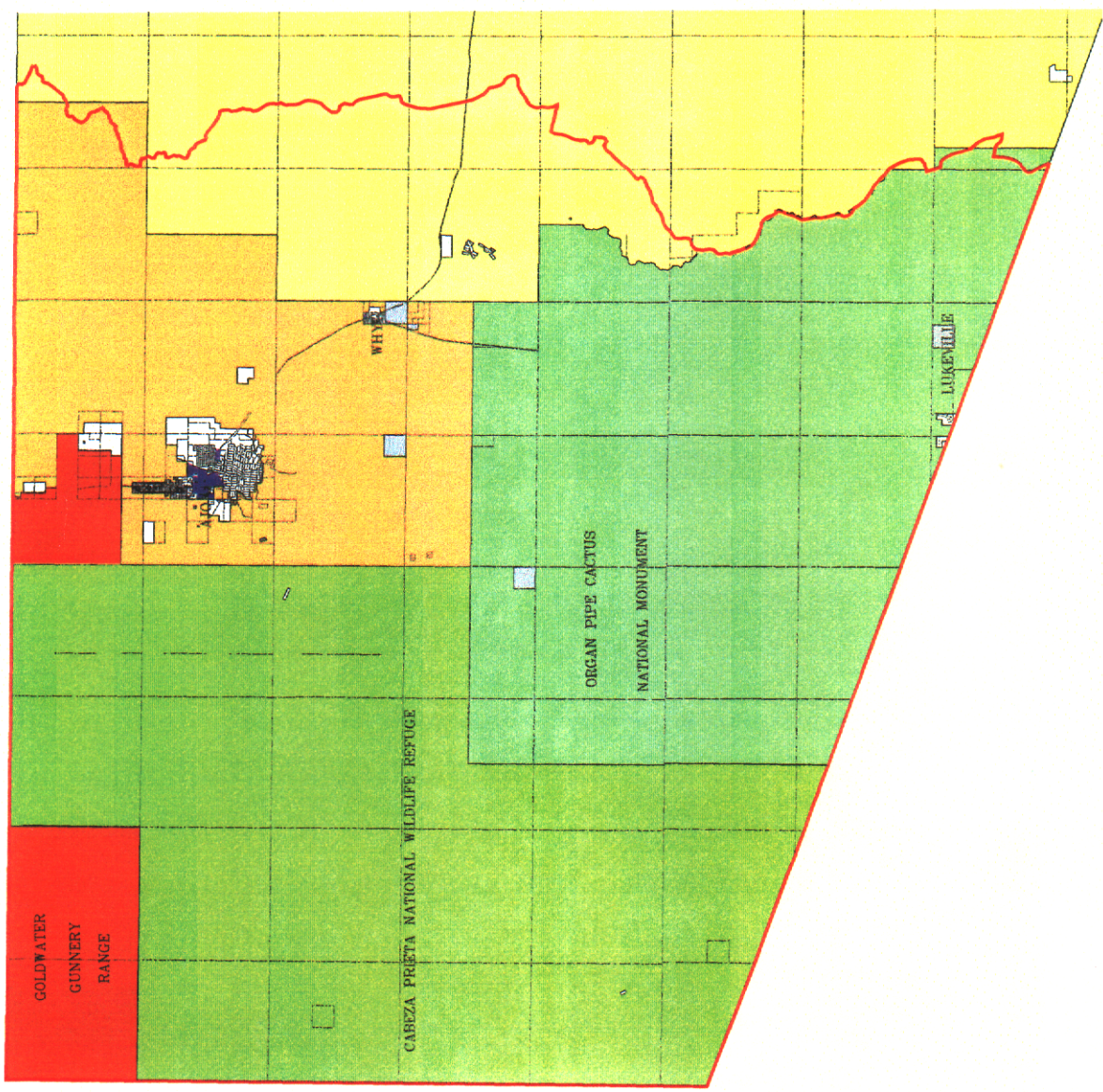
Index Map Scale 1:1,000,000



Scale 1:110,000



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 Fax: (520) 298-3469
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REFERENCES

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Pima County. "Impact of Unregulated Development on the Pima County Tax Base, Service Demand and Future Infrastructure", *Fiscal Impact of Land Use*.

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Pima County. *Water Resources and the Sonoran Desert Conservation Plan*.

USGS. Ajo/Cabeza Prieta Mountains, Lukeville, ARIZONA. *30 X 60 Minute Quadrangle*.

END NOTES

1. Pima County, *Land Stewardship in Pima County, Sonoran Desert Conservation Plan*, February 2000, Table 6, p. 14.
2. Pima County, *Ranching in Western Pima County*, April 2000, p. 6.
3. Pima County, *Water Resources and the Sonoran Desert Conservation Plan*, July 1999, p. ii.
4. Ibid, p. 3.
5. Ibid.
6. Pima County, *Land Stewardship in Pima County, Sonoran Desert Conservation Plan*, February 2000, p. 1.
7. Ibid, Figure 2, p. 8.
8. Ibid, p. 4.
9. Ibid, p. 1.
10. Pima County, "Impact of Unregulated Development on the Pima County Tax Base, Service Demand and Future Infrastructure Liability", *Fiscal Impact of Land Use*, February 2000.
11. Pima County, "Impact of Unregulated Development at the Community and Watershed Level", *Fiscal Impact of Land Use*, March 2000.
12. Ibid.
13. Ibid.
14. Ibid.