DRAFT

MEMORANDUM

Date: October 12, 2000

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

From: C.H. Huckelberry
County Administrator

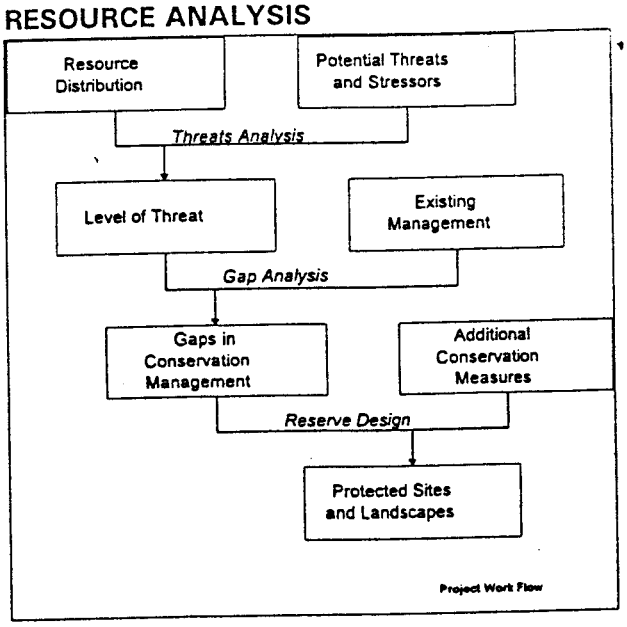
Re: **Preliminary Ranch Conservation Element**

I. Overview

Pima County has participated in Ranch Conservation efforts since the 1980s, contributing to the preservation of the Empire, Cienega, Empirita and Posta Quemada ranches. Through the conservation of ranchland in Eastern Pima County, the metropolitan urban boundary is better defined, vast landscapes of open space retain their integrity, and the heritage and culture of the West is preserved. Today we might take for granted that over half of our 2.4 million acre region in Eastern Pima County is open land, but the threats to existing ranches are real, and the conversion of a few single large ranches could tear irreparable holes in the integrity of the ranching landscape which would accelerate the conversion of other ranch lands. Since the draft Sonoran Desert Conservation Concept Plan was proposed in 1998, Pima County has purchased Carpenter Ranch in the vicinity of the Tortolita Mountains and discussions are ongoing with regard to the preservation Canoa Ranch. The attached report is the draft *Preliminary Ranch Conservation Element*. This memorandum summarizes and presents highlights from the *Preliminary Ranch Conservation Element* using the same analytical method of resource assessment that is found in all Elements of the Sonoran Desert Conservation Plan.

The substantial data set is organized in a manner that is parallel to the biological, riparian, cultural resources, and mountain parks work. Information is presented about the ranchland resource base itself; threats to the resource base; and management of the resource base. Read together, these factors outline the conservation potential of different subareas, and alternatives for reserve design in the area of Ranch Conservation. We can now, with the help of interested members of the community, begin the process of prioritizing resource protection strategies and integrating ideas about this reserve system with other elements of the Sonoran Desert Conservation Plan, including the biological (habitat and corridor), mountain park, riparian and cultural resource reserves.

RESOURCE ANALYSIS



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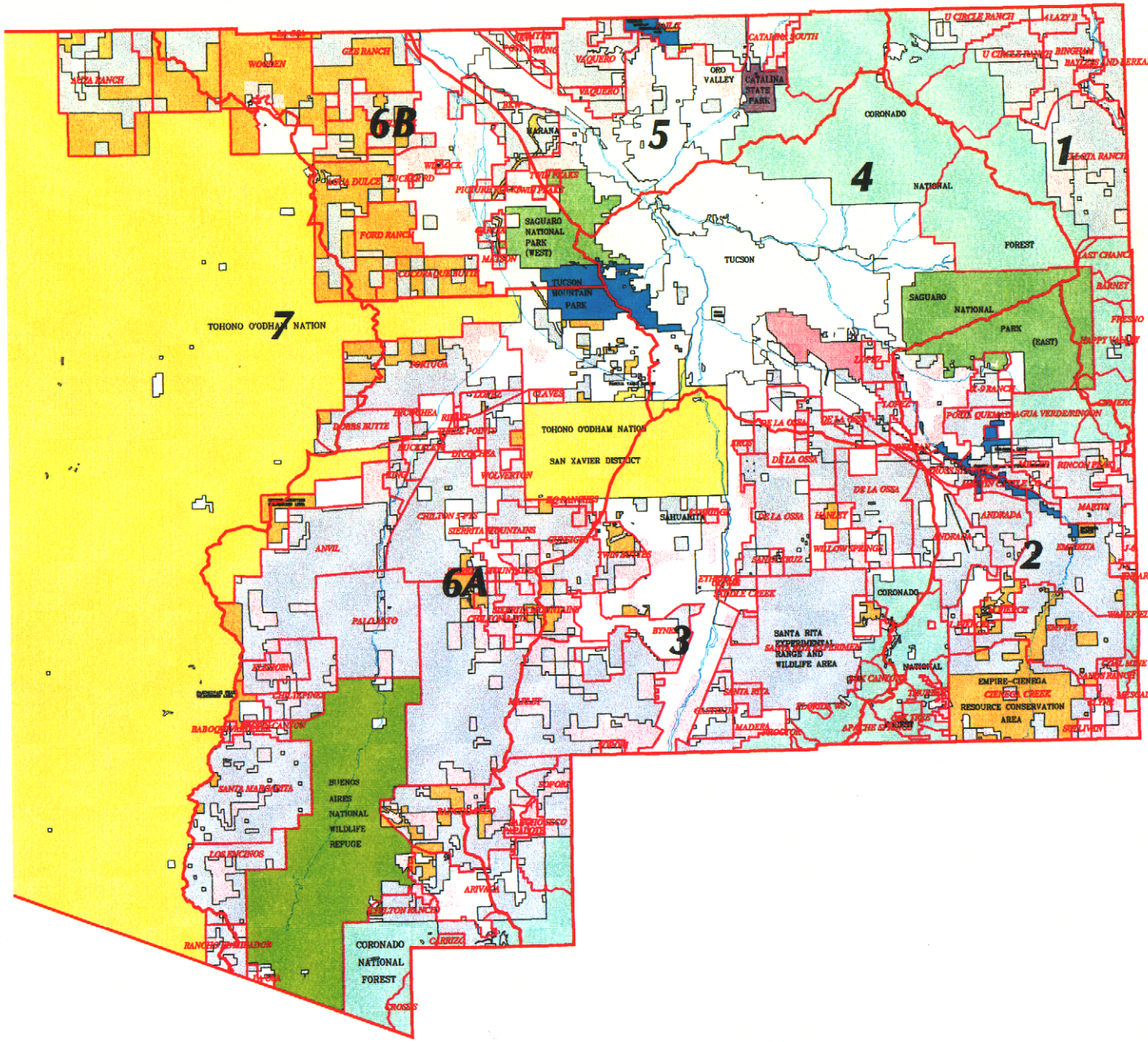
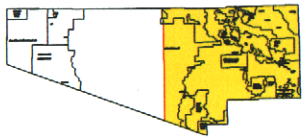
Pima County Ranches



- 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

Pima County Index Map



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/pygmyowl2/sonora/cultural/ssmjoined/plan_all/amls/ranch_bnds.aml 6/19/00

II. Description of the Resource Base

Pima County is divided into eight watershed planning units for purposes of the Sonoran Desert Conservation Plan. In assessing the extent of ranch lands within each planning unit, these factors were compared: the total acreage of the watershed; the percent of that land base in ranch use; the number of ranches in the area; grazing capacity; and the percent of federal and state land. By these measures, the Altar Valley, Empire-Cienega Valley, Upper Santa Cruz Valley, and Middle San Pedro area present the best opportunities for sustainable ranching in Pima County.

Highest Extent of Ranch Lands

1. Altar Valley
2. Empire-Cienega Valley
3. Upper Santa Cruz Valley
4. San Pedro Valley
5. Avra Valley
6. Tortolita Fan
7. Western Pima County
8. Middle Santa Cruz Valley

Highest Productivity or Grazing Capacity

1. Empire-Cienega Valley
2. Altar Valley
3. Upper Santa Cruz Valley
4. San Pedro Valley
5. Middle Santa Cruz Valley
6. Tortolita Fan
7. Avra Valley
8. Western Pima County

III. Threats to the Resource Base

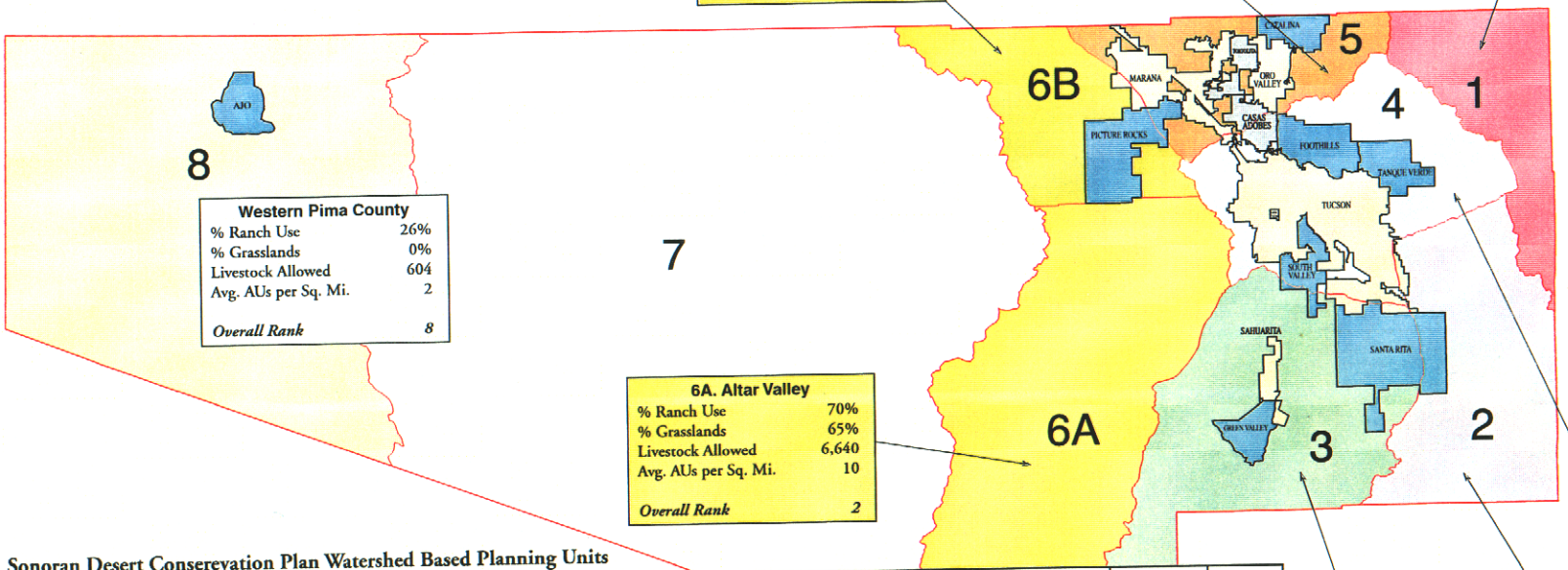
In assessing threats to the viability of continued ranching, these factors were compared by watershed planning unit: the average cost of an acre of land; the percent of private land that is not ranched; the existing zoning; the number of parcels; and the amount of land slated for sale in the near future by the State Land Department. By these measures, the planning units that are least likely to retain ranch uses in the future are the urbanizing areas of the Middle Santa Cruz, the Tortolita Fan and the Upper Santa Cruz Valley.

Highest Threats to Ranch lands

1. Middle Santa Cruz Valley
2. Tortolita Fan
3. Upper Santa Cruz Valley
4. Avra Valley
5. Empire-Cienega Valley
6. Altar Valley
7. Western Pima County
8. San Pedro Valley

LIVESTOCK GRAZING CAPACITY AT THE WATERSHED LEVEL

Highest Grazing Capacity			
Sub Area	AUs/Mi^2	Livestock Allowed	% Grasslands
Empire Cienega-Rincon	11	4,250	70%
Altar Valley	10	6,640	65%
Upper Santa Cruz	9	4,315	63%



6B. Avra Valley

% Ranch Use	68%
% Grasslands	3%
Livestock Allowed	834
Avg. AUs per Sq. Mi.	4
Overall Rank	*7*

5. Tortolita Fan

% Ranch Use	42%
% Grasslands	11%
Livestock Allowed	679
Avg. AUs per Sq. Mi.	5
Overall Rank	*6*

1. Middle San Pedro

% Ranch Use	91%
% Grasslands	46%
Livestock Allowed	1,917
Avg. AUs per Sq. Mi.	8
Overall Rank	*4*

Western Pima County

% Ranch Use	26%
% Grasslands	0%
Livestock Allowed	604
Avg. AUs per Sq. Mi.	2
Overall Rank	*8*

6A. Altar Valley

% Ranch Use	70%
% Grasslands	65%
Livestock Allowed	6,640
Avg. AUs per Sq. Mi.	10
Overall Rank	*2*

Pima County Livestock Grazing Capacity Watershed Comparison

SDCP Planning Units (Watersheds)
Incorporated Areas
Unincorporated Urbanizing Areas
Pending Incorporated Areas

Incorporated Areas
1. Marana
2. Oro Valley
3. Sahuarita
4. South Tucson
5. Tucson
Unincorporated Urbanizing Areas
1. Ajo
2. Arivaca
3. Catalina
4. Foothills
5. Green Valley
6. Picture Rocks
7. Santa Rita
8. South Valley
9. Tanque Verde
Pending Incorporated Areas
1. Casas Adobes
2. Tortolita

N

4. Middle Santa Cruz

% Ranch Use	15%
% Grasslands	18%
Livestock Allowed	666
Avg. AUs per Sq. Mi.	8
Overall Rank	*5*

2. Cienega – Rincon

% Ranch Use	77%
% Grasslands	70%
Livestock Allowed	4,250
Avg. AUs per Sq. Mi.	11
Overall Rank	*1*

3. Upper Santa Cruz

% Ranch Use	74%
% Grasslands	63%
Livestock Allowed	4,315
Avg. AUs per Sq. Mi.	9
Overall Rank	*3*

Sonoran Desert Conserevation Plan Watershed Based Planning Units

Area	Total # of Acres	% Private	% State	% Federal	% Grasslands	Rainfall (inches)	Water Sources	Livestock Max. Allowed	Livestock Avg. per Sq. Mile	% Ranch Use	Overall Rank
Middle San Pedro	174,314	14.5	38.7	47	46	15-25	368	1,917	8	91	4
Cienega - Rincon	318,535	22.6	39.3	38	70	15-23	642	4,250	11	77	1
Upper Santa Cruz	449,685	34.8	47.3	18	63	13-23	551	4,315	9	74	3
Middle Santa Cruz	361,852	55.6	5.5	38	18	11-19	92	666	8	15	5
Tortolita Fan	203,546	52.3	22.7	25	11	9-17	76	679	5	42	6
Altar Valley	713,807	20.0	45	35	65	11-19	864	6,640	10	70	2
Avra Valley	221,404	31.5	22	46	3	9-11	76	834	4	68	7
Tohono Nation	2,354,911	0.7	1.3	-	-	-	-	-	-	-	-
Western Pima County	1,082,282	1.2	.25	99	0	5-11	35	604	2	26	8
Pima County Totals	5,880,337							19,905			
Eastern Pima County Totals	2,443,144							19,301			
16 Urbanizing Areas	468,089										

IV. Current Management and Existing Gaps

The following recommendations are offered to fill the gaps in existing land management practices in order to support the Ranch Conservation Element:

(1) Establish a program that provides certainty for long-term leases;

(2) Establish a fairly constructed Purchase of Development Rights program for Pima County;

(3) Establish a means to compensate ranchers for decrease in their investment/purchase value of grazing leases at a certain stocking rate should the animal unit numbers be decreased;

(4) Effect changes in the property tax laws that allow a "conservation classification" for private lands for their open space values and that do not meet the agricultural requirements;

(5) Build flexibility into the State Statute that mandates 40 head of livestock as a minimum requirement for Agricultural lands tax status, especially in drought years or after fire events;

(6) Establish a "grass banks" program which would allow ranchers to "rest" pastures.

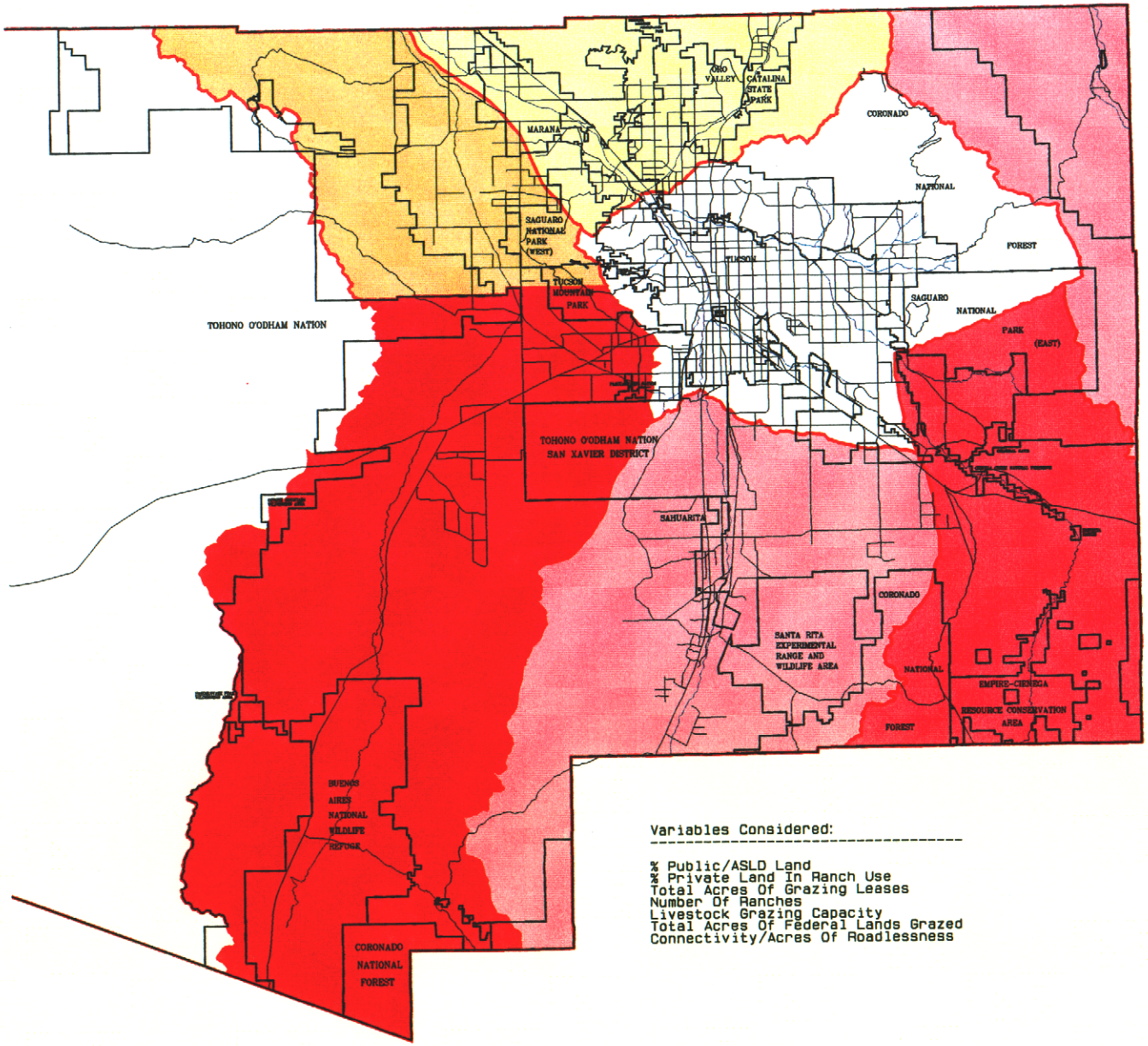
V. Conservation Opportunities

Altar Valley, Empire-Cienega Valley, Upper Santa Cruz Valley, San Pedro Valley, and now the Ironwood National Monument area of the Avra Valley are the subareas where ranching comprises a significant land use, and where grazing capacity and stability suggest the best potential for future sustainable ranch use. Ranch lands in these valleys have the best potential to define the urban boundary, where developing lands at the urban edge give way to natural open space. In order of highest to lowest conservation potential, the watersheds rank as follows:

Highest Ranch Conservation Potential

1. Altar Valley
2. Empire-Cienega
3. Upper Santa Cruz Valley
3. San Pedro Valley
4. Western Pima County
5. Avra Valley
6. Tortolita Fan
7. Middle Santa Cruz

Ranch Land Conservation



Variables Considered:

% Public/ASLD Land
% Private Land In Ranch Use
Total Acres Of Grazing Leases
Number Of Ranches
Livestock Grazing Capacity
Total Acres Of Federal Lands Grazed
Connectivity/Acres Of Roadlessness

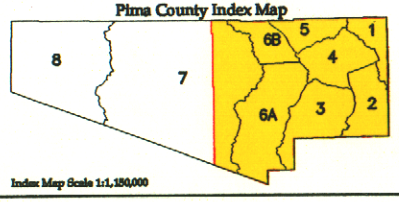
Highest Potential for Ranch Land Conservation

- 1 Altar Valley
- 2 Empire-Cienega Valley
- 3 Upper Santa Cruz Valley
- 3 San Pedro Valley
- 4 Western Pima County
- 5 Avra Valley
- 6 Tortolita Fan
- 7 Middle Santa Cruz Valley

Planning Units

1. San Pedro Valley
2. Cienega-Rincon Valley
3. Upper Santa Cruz Valley
4. Middle Santa Cruz Valley
5. Tortolita Fan
6a. Altar valley
6b. Avra Valley
7. Tohono O'odham
8. Western Pima County

Pima County Index Map



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/pygmycow12/sonora/cultural/asmjoined/plan_all/amls/cons_ppc.aml 6/29/00

VI. Conclusion

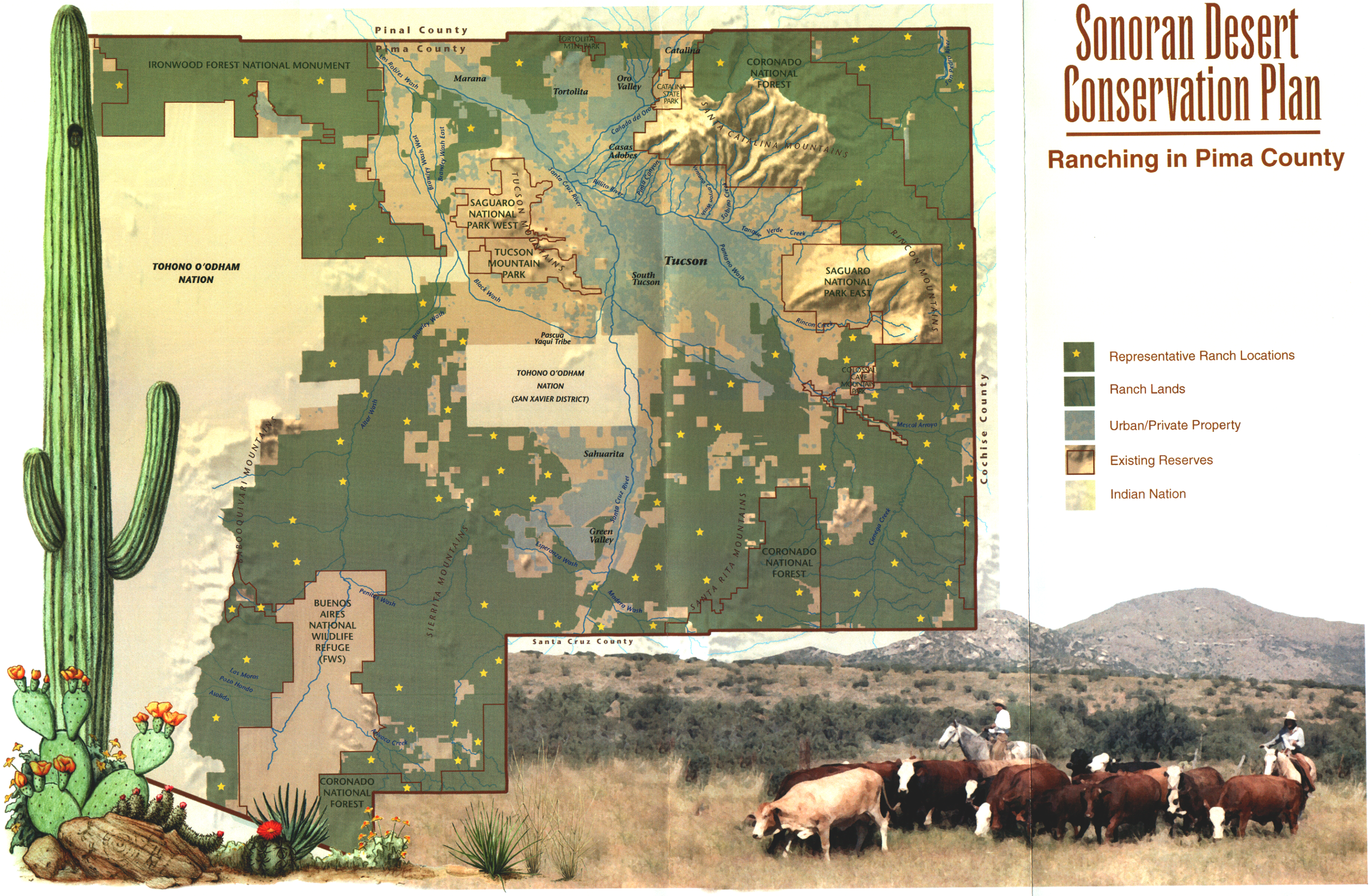
The Preliminary Ranch Conservation Element provides an objective analysis of ranch land resources in Pima County, founded on basic understandings, including:

- Ranch land becomes threatened when the land is no longer valued for its natural productivity and is instead valued as a commodity.
- By virtue of its extensiveness as a land use, ranching is uniquely able to preserve the integrity of vast tracts of connected and unfragmented natural open space and wildlife habitat.
- Because ranching is a large-scale land use, the complex mosaic of land ownership that characterizes much of Pima County's rural areas becomes a manageable whole under the stewardship of ranchers who have a vested interest in improving the health and productivity of the natural landscape.
- The connectivity of ranchlands offers the most effective and best way to define urban form in Eastern Pima County.

To prevent unwanted urban sprawl and unregulated development, it is most important that Pima County encourage and retain viable ranches. Ranching is a significant land use that has served to protect our natural open space, and it continues to be an important traditional industry that has shaped the rural landscape. Through continued development of the Ranch Conservation Element, and the establishment of the Ranch Division within the Pima County Natural Resources, Parks and Recreation Department, Pima County will be in a position to respond to ranch conservation issues and continue to integrate this Element into the overall Sonoran Desert Conservation Plan.

Sonoran Desert Conservation Plan

Ranching in Pima County



Our Common Ground - Ranch Lands in Pima County
A Conservation Objective of the Sonoran Desert Conservation Plan

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Our Common Ground - Ranch Lands in Pima County
A Conservation Objective of the Sonoran Desert Conservation Plan

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I. Executive Summary - Findings and Recommendations

By virtue of its extensiveness as a land use and the ongoing land stewardship provided by ranchers, ranching in Pima County is uniquely suited to preserve natural, unfragmented open space, habitat, and the land's natural and cultural resource values. Consequently, ranch conservation was identified by the Pima County Board of Supervisors as a conservation element of the Sonoran Desert Conservation Plan.

In order to characterize ranching as a land use, data were gathered both regionally and by subarea to objectively describe, map, and quantify this land use in terms of its extent, productive capacity, threats, and conservation potential. A simple but multivariate analysis was conducted to evaluate ranch lands and ranching as a land use throughout Pima County. What results is the following preliminary assessment and comparative rankings of the different subareas.

Highest Extent of Ranch Lands

1. Altar Valley
2. Empire-Cienega Valley
3. Upper Santa Cruz Valley
4. San Pedro Valley
5. Avra Valley
6. Tortolita Fan
7. Western Pima County
8. Middle Santa Cruz Valley

Highest Productivity or Grazing Capacity

1. Empire-Cienega Valley
2. Altar Valley
3. Upper Santa Cruz Valley
4. San Pedro Valley
5. Middle Santa Cruz Valley
6. Tortolita Fan
7. Avra Valley
8. Western Pima County

Highest Threats to Ranch lands

1. Middle Santa Cruz Valley
2. Tortolita Fan
3. Upper Santa Cruz Valley
4. Avra Valley
5. Empire-Cienega Valley
6. Altar Valley
7. Western Pima County
8. San Pedro Valley

Highest Ranch Conservation Potential

1. Altar Valley
2. Empire-Cienega
3. Upper Santa Cruz Valley
3. San Pedro Valley
4. Western Pima County
5. Avra Valley
6. Tortolita Fan
7. Middle Santa Cruz

Consistency in the analyses identify the Altar Valley, Empire-Cienega Valley, Upper Santa Cruz Valley, San Pedro Valley, and now the Ironwood National Monument area of the Avra Valley as the subareas where ranching comprises a significant land use, and where grazing capacity and stability suggest the best potential for future sustainable ranch use. It is therefore concluded that ranch lands in these valleys have the best potential to define the urban boundary, where developing lands at the urban edge give way to natural open space.

II. Introduction - Ranch Conservation & the Sonoran Desert Conservation Plan

Our common ground — our natural and cultural landscape, our sweeping open spaces, our recreational areas, our refuge from the city, and home to sensitive biological systems and traditional rural communities — is seriously threatened by increasing subdivision, urbanization and leap frog development, which fragments the landscape and destroys the connectivity and the integrity of these open spaces. Much of this open space historically supported agricultural endeavors principally cattle ranching, an extensive rather than intensive use of the landscape, which respected the natural form of the land and has served to protect our common ground from the much greater and permanent impacts of intensive development.

Comprised of a mosaic of land ownership, most ranches include a relatively small amount of deeded private lands and larger grazing allotments on lands owned by federal and state land management agencies. While cattle ranching in Pima County began in the 1690s with the first Spanish mission settlements using an entire landscape claimed for Spain, this mixed composition of ranch land dates only to the 1800s, continues today and typically accommodates multiple uses, such as recreation, hunting, mining, and timber harvesting.

With sound management practices and careful land stewardship, sustainable ranching can maintain natural ecosystems, increase biodiversity, conserve water resources, and provide a "working landscape" for people living in rural communities. However, faced with rising land prices, development pressure, changing livestock markets, and increasing political uncertainty over access to grazing lands, many ranching families have been faced with the difficult choice of either continuing to ranch with the possibility of risking their financial well-being, or selling their private land holdings for development. Often the decision is to sell, especially where development pressure is high.

If this trend continues, Pima County's open spaces will be increasingly subdivided and fragmented, resulting in the loss of natural habitat and the ability of the land to support a rich diversity of plants and animals and a working environment for its rural communities. Sustainable ranching and ranch land conservation are therefore recognized by the Sonoran Desert Conservation Plan as key solutions to preserving what remains of Pima County's natural and cultural landscape.

II-1. Purpose of the Report

As the regional synthesis for the Ranch Conservation element of the Sonoran Desert Conservation Plan, the purposes of this report are several: to provide a statement of how ranch conservation is compatible with the goals of the Sonoran Desert Conservation Plan; to describe the current extent and land base dedicated to ranching; to characterize ranching in each of the subareas or valleys of Pima County; to assess the status of threats to ranching such as the conversion of ranch lands to real estate; and to assess the potential for sustainable ranching in each of the valleys.

To conduct these assessments objectively, existing data were obtained from public records, for each subarea and for the region as a whole, that are quantified, and comparative evaluations are provided. Finally, recommendations for the Ranch Conservation element are presented that consider these variables and the realities of growth and urban expansion.

II-2. Integration of Ranch Conservation & the Sonoran Desert Conservation Plan

As noted elsewhere, the principal goal of the Pima County Sonoran Desert Conservation Plan is to protect and conserve the natural environment using long-range planning to ensure that our natural and urban environments not only coexist but develop an interdependent relationship, where one enhances the other. The Conservation Plan will guide already approved public bond investment, conservation, and preservation actions, and it will help to establish federal program and funding priorities and establish preference for our region's expenditure of funds to preserve and protect State Trust lands threatened by urbanization. Ranch Conservation will help to achieve a variety of goals compatible with the Conservation Plan.

Defining the Metropolitan Urban Boundary: Earlier reports on growth described the uneven distribution of State Trust lands throughout Arizona and the high and disproportionate amount of State Trust lands in eastern Pima County. When combined with private land ownership, fully 64 percent of eastern Pima County could be developed, given the mandate of the Arizona State Land Department to derive maximum revenue from its lands through sale or lease for its beneficiaries. This amounts to 2494 square miles or nearly 1.6 million acres. If this entire area were to be developed, the Tucson urban area would be nearly 16 times greater in size than it currently is! Sprawl will have found its natural limit with no additional land to develop, and the several natural reserves that today encircle the urban area would be left as mere islands of natural open space.

While this dire description of a completely developed eastern Pima County is probably not likely to occur because of other limitations, it does speak to the possibility of ever-expanding development and the loss of natural open space. Ranch conservation is one important mechanism to help define the urban boundary, preserve natural open space and habitat values, and allow the sustainable use of the land for grazing to continue. Because the greatest majority of ranch lands are State Trust grazing leases, the 109 allotments or grazing lease areas essentially show where operating ranches have remained viable. In addition to the existing land reserves such as Saguaro National Park, Coronado National Forest, and Tucson Mountain Park among others, operating ranches and their public land grazing leases currently help to define the limits of the metropolitan area.

Preserving Western Heritage and Culture: While perhaps less measurable than loss of lands, the specialized funds of knowledge and culture embodied and held in the ranching community continue to be eroded as ranch lands are sold for development and children of ranching families seek other means of livelihood. Culture may be defined as a set of norms, ethics, beliefs, knowledge, goals, and values shared by a society or community with practices that reinforce those values and inform members of that society about themselves, how to conduct themselves, and how to interact with their environment.

While certainly part of the greater American society, the ranching community, farmers, miners, and yes, even office workers all have a unique culture and fund of knowledge that allows them to operate effectively in their social and working environment. For ranching and farming families, there is a knowledge and intimacy with the land that grows out of first-hand experiences. Moreover, they have the benefit of a wealth of wisdom passed on from

previous generations who lived on the same land and knew how to conduct the business of cattle growing, crop cultivation, and caring for the land. These funds of knowledge simply cannot be learned and understood as well as someone raised in that culture and on the land. Agriculturalists, in particular, have very specialized knowledge on which all members of our larger society are dependent. Even if new places of food production are being created and affecting our global market, it is a significant risk to become entirely dependent on these sources and lose this knowledge. Both the knowledge of how to produce food and the capacity for agricultural production are critical to the very existence of any society. Sustaining that knowledge of the land and allowing ranchers to continue to practice their livelihood and manage the land to improve its natural productivity and health will result in better long-term stewardship.

Ranching and Cultural Resources: Ranch conservation can also be considered a cultural resource conservation objective because it fosters the continuation of traditional lifestyles and preserves the historical and cultural landscapes that contribute to the visual, social, and cultural and historical character of our greater community. Ranch conservation will also help to preserve specific historic properties associated with ranching, such as historic ranch buildings, as well as entire ranching landscapes, shaped by the natural land form, that encompass buildings, fences, corrals, camps, pastures, watering sites, roads, and other features placed on the natural landscape. Moreover, because ranching preserves the natural landscape and environment, archaeological sites, prehistoric settlement systems, and traditional cultural places valued by Native Americans and other cultural groups are also preserved.

To date, approximately 8,000 archaeological and historical sites and buildings have been identified in Pima County, and it may be estimated that between 40 to 60 percent of all recorded sites have been destroyed by development, both regulated and unregulated. Because most cultural resources surveys are completed in advance of development projects, many sites are sequentially identified, recorded, investigated, documented, and then destroyed by the development, whether a county flood control project, ADOT highway construction, subdivision development, or shopping center. Areas where the greatest protections have been achieved for cultural resources include existing reserves like Saguaro National Park where development is precluded, or in ranching areas where development is limited and where preservation of the natural landscape is essential to the ranching operation. In these areas, not only are individual sites preserved, but the entire cultural landscape is preserved to provide meaning and context.

Maintaining a Rural Industry & Diversifying the Local Economy: Despite price uncertainties on both the input and output sides, yield variability, and operating expenses that approach more than 70 percent of gross sales, ranchers and farmers in Pima County contributed $46,861,000 to the state and local economy in 1997, up some 21 percent from 1992. Much of this agricultural productivity in Pima County can be attributed to individuals, families, family corporations and trusts that own relatively small deeded parcels, usually the original homestead site, and lease public lands for grazing. Most ranches and farms are small to moderate sized operations, and many produce only supplementary income for their owners, with an average net cash return of $29,746. The net return to the 419 Pima County farms and ranches was nearly $12,500,000.

In Pima County, the USDA reports that 1185 direct farm workers were hired in 1997 by some of the owners of the 419 farms and ranches in Pima County. When these workers and the owners of the farms are considered, there were at least 1600 people directly employed, at least part-time, in farm production. If the suggested multiplier of 1.9 is applied, the employment estimate for Pima County may be roughly about 3050 jobs. Hired positions alone accounted for a payroll of nearly $9.4 million.

As for income in Pima County's economy, it was earlier noted that the net return to farmers and ranchers after expenses was about $12.5 million. If the same multiplier is used, there is an estimated $25.0 million added to the local economy from the agricultural sector. How accurate these very rough estimates are may be arguable; however, the point of this discussion is to demonstrate that agricultural pursuits remain a viable industry that provides employment and income to residents in Pima County.

Conserving Water Resources: Ranch conservation is critical to conserving water resources, especially ground water. Simply put, ranches use far less ground water than subdivisions, which can rapidly exceed the area's safe yield or the amount of water an aquifer will yield without depletion. Two brief studies are presented to illustrate how sustainable open range ranching can conserve water sources and accommodate both grazing and wildlife use.

Sonoita Valley:

The Sonoita Valley relies entirely on rainfall stored as groundwater according to studies conducted by the Yale School of Forestry and Environmental Studies. Using hydrological data for the western portion of the Sonoita area, researchers developed an annual water budget for the Sonoita area based on estimates of recharge of 3980 acre feet of water per year. According to the study, a cow/calf animal unit consumes about 15 gallons of water on a hot, dry day. Moreover, when cattle and wildlife like pronghorn, deer, and javelina that drink from the same water sources are considered, only 14 acre feet of water are used per year. (An acre foot of water is equal to 325,850 gallons.)

In contrast, a single person in Sonoita consumes about 10 times as much water as cattle or wildlife, and average use for one person is about 150 gallons of water per day, or about 0.17 acre-feet of use per year. A conservative estimate of total residential water use for about 2000 residents in Sonoita is 337 acre feet per year. Present water use by residents, commercial uses, and ranching remains below the safe yield estimate amount, and sufficient recharge helps to maintain adequate water flows in Cienega Creek, home to a number of threatened and endangered species of fish.

However, future population and residential growth will likely consume and exceed surplus recharge over time. Although the researchers estimate that the safe yield development density in Sonoita is one residence per approximately 12 acres, current zoning allows a minimum lot size of about 4 acres or approximately 8200 homes, which would consume 3900 acre feet of water each year, more than three times the available surplus recharge. More than one house per 12 acres means that Sonoita would have to mine its groundwater. To insure safe-yield, the minimum size of a parcel would have to be tripled from 4 to 12 acres, or risk depletion of groundwater and loss in surface flows in Cienega Creek.

Arivaca Ranch:

In the Arivaca area, a water consumption study was recently completed that developed estimates of water use for the pre-subdivided Arivaca Ranch before 1970 and current use by the "wildcat" subdivision known locally as *"The Forties"* that resulted from the sale of the Arivaca Ranch. Before 1970, Arivaca Ranch was made up of about 10,500 deeded acres plus various grazing leases on state and federal land. There were only ten wells in the entire watershed. In 1970, Fred Boice sold 10,000 acres to Nationwide Resources, who unsuccessfully tried to get a higher density zoning approved. The old ranch was subsequently sold as 40-acre, lot-split parcels. Using this strategy, *"The Forties"* were sold in phases over the next five years.

As the new owners discovered they were able to sell off 30 of their new 40 acres and pay-off their remaining 10 acres, "wildcat" subdividing began in earnest. Many new owners of10-acre lots chose to subdivide, or lot-split yet again, resulting in parcels as small as 2.5 acres. The result was that by 1999, there were 477 parcels of various sizes spawned from the original 156 subdivided forty acre parcels. Many of these owners drilled wells, resulting in 242 new wells in the old Arivaca Ranch area. Analysis suggests that the current *"Forties"* wildcat subdivision presently uses 6.3 times the amount of water used by one working cattle ranch in 1970, and if built-out to its potential 1560 parcels, it could use more than 51 times the amount of water used by the old Arivaca Ranch.

The various studies are clear in their conclusions. People on average consume about 10 times more water per capita than cattle. In comparison to developed areas on the same amount of acreage, cattle ranches using open range have a much lower rate of water consumption and provide water for both cattle and wildlife. However, when private ranch lands are sold, wildcat subdivisions are often created, which have the potential to significantly increase water use and pose risk to the water table and to the viability of live streams like Cienega Creek.

Preserving Unfragmented Natural Open Space and Wildlife Habitat: Ranch conservation preserves the natural landscape to provide unfragmented open space and habitat critical for maintaining sustainable and diverse ecosystems and wildlife corridors. It was noted elsewhere that in eastern Pima County about 13 acres of natural open space are being converted every day to residential or commercial uses, contributing to urban sprawl and leap-frog development, whether regulated or unregulated.

It has also been noted how ranching defines the current urban boundary of the Tucson metropolitan area and how that urban boundary could expand by as many as 60,000 acres in the next five years, one ranch at a time. When a new urban boundary is formed, it is the next ranch and its allotments that become vulnerable to sale, creating yet another cycle of converting ranch lands to real estate. As the entire agricultural industry becomes less viable due to this conversion of land use, more marginal ranch holdings may be converted to wildcat subdivisions further fragmenting the landscape. Unfortunately, many of these relatively small, deeded parcels are also some of the most biologically sensitive and productive lands.

If the goals of the Sonoran Desert Conservation Plan are to conserve our natural environment and to allow our diverse ecosystems to persist and thrive, it is imperative to protect natural open space from further fragmentation. At the present time, eastern Pima County still has

the opportunity to achieve these goals because ranch lands outside the urban boundary form adjacent, continuous, and extensive tracts of natural open space that retain some of the most critical and productive wildlife habitat. These open spaces provide connectivity across valleys, provide a variety of habitats from riparian bottomlands, to bajadas and foothill and mountain environments, and they remain largely intact.

Historically, ranching has proved uniquely capable of protecting these vast open spaces. Because of southern Arizona's aridity, large land areas are required to support sustainable ranching operations. Out of a combination of economic and ecological interests in the land, which creates the incentive to restore and maintain the land's natural productivity, most ranchers have become good stewards, managing the land for its long-term health rather than short-term gain.

Benefits to the Ranching Community: As a consequence of growth, however, native species are becoming endangered, and there are growing risks of landowner liability under the Endangered Species Act. To address this risk, Pima County is seeking a Section 10 Permit under the Act. This will allow the region to go forward in compliance with federal species protection laws with reduced liability, provided that an approved habitat conservation plan (HCP) is in place for the region and is being implemented. Under this large-scale, regional HCP, the permitee may identify a broad range of activities that may be brought under the "umbrella" of the permit's legal protection.

This permit will then allow the community to continue to pursue economic development and agricultural activities, as long as the permitee and private landowners are implementing the terms and conditions of the permit. It is the goal of the Sonoran Desert Conservation Plan that the ranching community will be afforded much greater protections, greater certainty of land tenure, possible incentives for even larger stewardship roles, and protection of property rights.

II-3. Variables Used to Characterize Ranch lands

In order to describe and quantify the extent and productivity of ranch lands in Pima County and to define the Ranch Conservation element for the Conservation Plan, a set of measurable variables was prepared that would serve to characterize ranching and ranch lands in each of the watersheds and the region and provide information for ranch land evaluation and conservation planning. These variables were developed by staff and presented to the Ranch Conservation Technical Advisory Team for review and discussion. In addition to being measurable, the variables had to be mappable for inclusion in the County GIS system.

After considerable discussion, the following list of land-based variables were accepted to characterize Pima County ranch lands. Moreover, the Technical Team concluded that critical consideration be given to certain principles to guide this research – use quantifiable variables or measures, use only existing data from public sources, maintain objectivity in the research, describe ranching as accurately as possible, and respect the privacy of individuals and families. As a consequence of several meetings, the Ranch Conservation Technical Advisory Team and County staff decided on the following list of variables to define the Ranch Conservation element. Data were obtained almost entirely from public sources that include the US Department of Agriculture, the Natural Resources Conservation Service, the University

of Arizona, the Arizona State Land Department, the Bureau of Land Management, the US Forest Service, the Arizona Department of Water Resources, Pima Association of Governments, Arizona Game and Fish Department, and the Pima County GIS Technical Services Department, among others. Data were obtained and entered either as electronic files or mapped and digitized into the GIS system as separate "covers" for many of the following variables.

While not all the listed variables proved to be available or equally accurate or useful, the entire list is included to indicate what variables were considered to be relevant to defining this element, and future research will seek to expand the information available for these variables.

Table II-3.1 Variables Considered to Characterize Ranching in Pima County

Environmental Characteristics for each Watershed:

- Soils (kinds, acres)
- Geology (kinds, acres)
- Elevation
- Topography
- Vegetation zones:
    - Desert scrub (acres)
    - Grasslands (acres)
    - Uplands (acres)
    - Other zones
- Natural water sources: (rivers, springs, streams, tributaries, shallow ground water)
- Created water sources: (windmills, wells, stock ponds, tanks, etc.)
- Climate & rainfall data

Ranch Characteristics for Each Watershed:

- State Trust Land Grazing Leases or SLUPs: (names, numbers, boundaries, acres)
- BLM Grazing leases: (names, numbers, boundaries, acres)
- US Forest Service Leases: (names, numbers, boundaries, acres)
- Ungrazed State or Federal lands (parcel boundaries, acres)
- Ranch Boundaries: (names, numbers, acres)
- Land Status/Ownership: (private, State, Federal acres)
- Private Land Used as Agricultural land - Assessor records (parcels, acres)
- Retired Agricultural Land (parcels, acres)
- Private Land Used in Ranching - Assessor records (parcels, acres)
- Private Land Not Used in Ranching - Assessor records (parcels, acres)
- Ranch Improvements:
    - water sources
    - pastures
    - corrals
    - buildings
- Ranch Management Plans (yes/no, acres under management)
- Grazing Capacity (AUs permitted)
- Hunting Unit maps (number of hunting permits)
- Recreational Use (Ranch Sign-In - numbers of people)
- Water Rights (wells, acre feet)
    - Active farm land
    - City of Tucson
    - Private

Development Characteristics and Threats to Ranch land Conservation:

- Population
- Town sites
- Land Ownership (high% private ownership)
- Regulated Subdivisions (parcels, acreage)
- Lot-split Subdivisions (parcels, acreage)
- ASLD SLUPs designated for Commercial Use
- Proximity to Urban Boundary
- Major Transportation Corridors
- Rent-a-Cow (committed lands for which Specific Plans, development zoning are filed)
- Areas of Fragmentation (lot splits, subdivisions, other development)
- Increasing Land Values (average land value)
- Loss of croplands (acres)

Conservation Potential of Ranch lands:

- Rural Homestead (RH) Zoning (acres)
- Land Ownership (high % State or Federal ownership)
- Extent/Contiguity of Ranch lands (% of area, acres)
- Ranches in Operation (number, acres in use)
- Stability of Grazing Leases (leases/permits)
- Stability of Land Values
- Grazing Capacity (AUs allowed)
- Grazing on Preserves (acres)
- Roadless Areas (acres)
- Low Fragmentation (few areas of subdivisions)

II-4. Organization of Report

In order to provide a regional synthesis and comparative analysis of ranching in the different subareas or valleys of Pima County, this report provides summary information as well as more specific information for each of the valleys. The report includes an introduction to the topic of Ranch Conservation, a discussion of the integration of Ranch Conservation with the goals of the Sonoran Desert Conservation Plan, and provides a summary regional overview that discusses the extent of ranch lands in Pima County, where urbanization is occurring and where this poses a threat to the continuation of ranching as a land use, and a brief comparative assessment of the different valleys. Complete, somewhat revised drafts of each subarea report on ranching are also included to provide more specific information. The section on "Findings" discusses four areas critical to the stability and sustainability of ranching – the extent of the land base committed to ranching use and ranch land grazing capacity, the threats to ranching as a land use, and the conservation potential of ranch lands. Based on both a regional assessment and comparative analysis that reviews each of the valleys on these factors, a rank or score will be assigned to each valley. The report will conclude with alternative recommendations for ranch land conservation based on the above assessment and projected urban expansion.

III. Overview of Findings

As noted above, this section provides a quick summary of the findings. Later sections detail and quantify the variables considered and the valley to valley comparisons, and subarea reports provide contextual information and additional detail. Finally, the watershed subareas are compared and ranked according to the extent of ranch lands, the capacity for ranching use, the threats to ranching as a continuing land use, and the conservation potential for ranch lands in each valley.

III-1. Ranch lands in Pima County

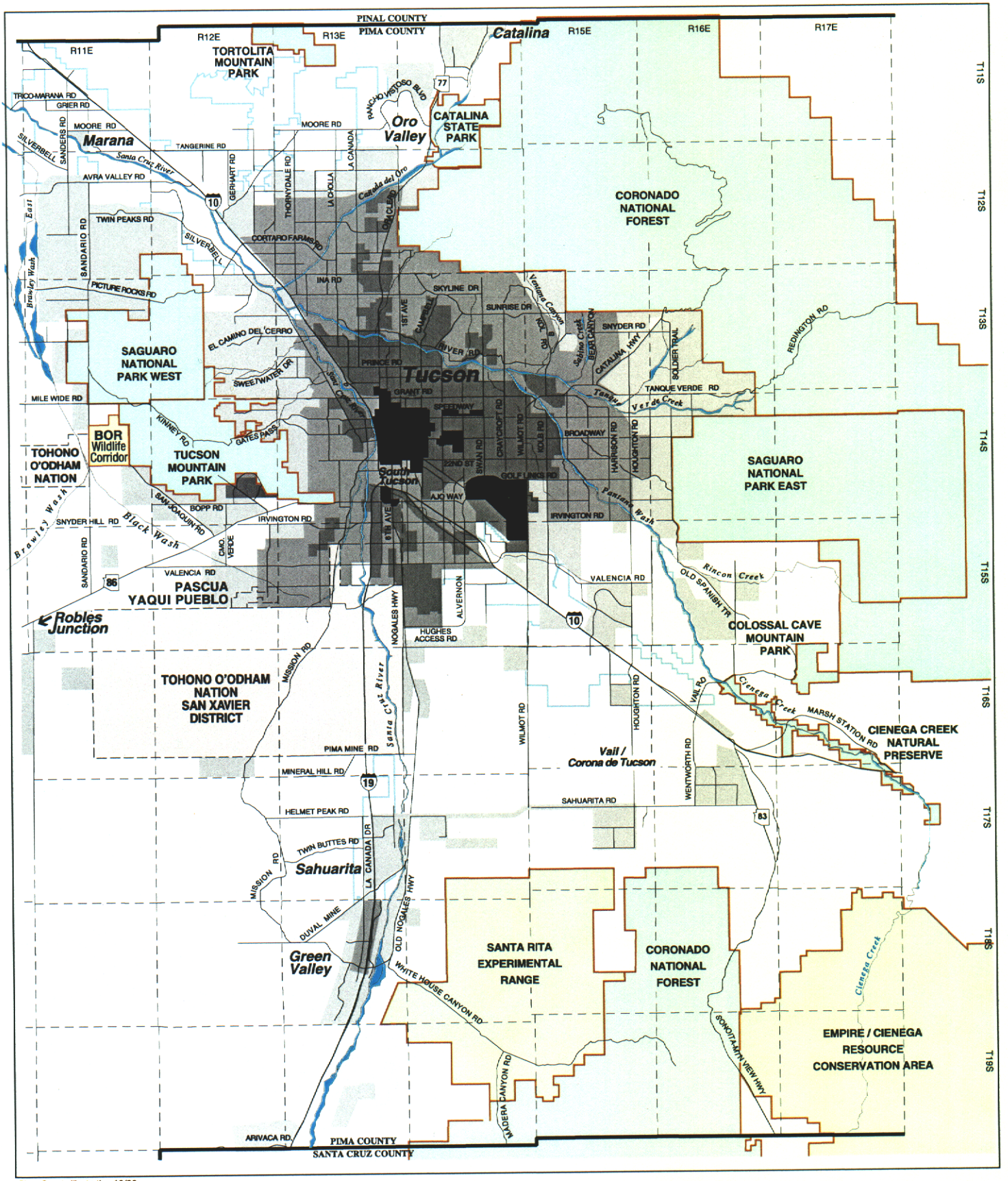
Ranching and agricultural pursuits remain as significant and productive uses of more than 60 percent of eastern Pima County and about 50 percent of the entire county, not including tribal lands. The mosaic of land ownership of private, state, and federal lands that characterizes ranching is an accident of history that is described in later sections, but it provides an unusual set of circumstances where ranching as a large-scale and extensive land use is effective in combining these varied ownerships into a manageable whole. Approximately 2.9 million acres are used in ranching and agriculture throughout Pima County, and 1.6 million acres in eastern and western Pima County. Most ranches are comprised of a small core of deeded private lands and larger state and public land leases that form the majority of their land base. State Trust lands provide the majority of the region's grazing leases, followed by BLM, Forest, and private holdings.

By virtue of its "extensiveness" as a land use, which preserves the natural form of the land, ranching is uniquely able to maintain the integrity of vast tracts of connected open space and wildlife habitat. Lands used in ranching are, however, largely indistinguishable from any of the other natural area preserves and public lands throughout the county. Consequently, ranching as a land use, when viewed from an urban perspective, is not very obvious and remains largely invisible to many urban dwellers and even urban planners and developers in the metropolitan Tucson area who tend to view ranch lands as "development reserve land" or "raw land." Because of the focus on the urban area, ranching and ranch lands in Pima County have never been objectively defined, comprehensively mapped, or characterized and evaluated for land use planning purposes. The Sonoran Desert Conservation Plan has provided the opportunity for ranch lands to be characterized and understood not just for their development potential but rather for their conservation potential as a land use that serves a number of community and conservation goals.

Subareas with the greatest extent and integrity of ranch lands include the Altar Valley, the Empire-Cienega Valley, the Upper Santa Cruz Valley, and the San Pedro Valley.

III-2. Urbanization and Threats to Ranch lands

Simply put, population growth, the demand for low-density housing, rising land values, and relatively low economic returns on ranching create significant pressures on ranchers to sell their private deeded lands (often the most environmentally sensitive lands) for development. The transition of ranch lands to real estate began in the period following World War II with the start of phenomenal population growth in Arizona, particularly in the Phoenix and Tucson areas, where the population grew almost 74 percent from 1950-1960, and state-wide the



Pima County Illustration 10/98

Urban Expansion in the Metropolitan Tucson Area

1940 1960 1985 1990

population grew some 257 percent from 1970-1997. This population boom began the transformation of the state's economy from a rural extractive base derived from cattle, cotton, and copper to an urban commercial economy. Consequently, land became valued, not for its natural productivity that might support ranching or farming, but for its higher value potential for residential and commercial uses. Furthermore, because land tends to be "cheaper at the edge," developers have sought to buy former ranch lands at the outer limits of the built metropolitan area, creating new subdivisions and even new communities, and some private property owners have also capitalized on growth by lot-splitting their land into wild-cat subdivisions. Consequently, the Tucson metropolitan area has experienced rapid expansion of its suburban areas pushing its urban limits ever outward as a consequence of regulated and unregulated growth, one ranch at a time.

Table III-2.1 Incorporated Area in Acres of Pima County Cities and Towns

City of Tucson	South Tucson	Marana	Oro Valley	Sahuarita		TOTAL AREA
125,064ac (195mi^2)	647ac	47,306ac	17,904ac	9,205ac	=	200,126ac (312mi^2)

The direction of this growth is determined in part by the location of transportation corridors, existing infrastructure, rising land values, and proximity to the urban boundary. Examination of these variables reveals that lands in and adjacent to the incorporated limits of Tucson, Oro Valley, Marana, and Sahuarita are rapidly developing as are lands along the Interstate highway corridors. Private lands that are under the greatest development pressure to be converted from ranch use to urban uses tend to occur within a 25 mile radius of the intersection of I-10 and I-19. Additionally, some 53,000 acres of State Trust lands that have been reclassified for commercial sale or lease also tend to be located within this 25 mile radius. These State lands together with BLM lands for disposal and interspersed private holdings total some 88,000 acres of current ranch lands that could become available for urban expansion. The watersheds where threats to current ranch lands are highest include the Middle Santa Cruz Valley, the Tortolita Fan, and the Upper Santa Cruz Valley. Additionally, the greatest portion of ranch land fragmentation occurs within the 25 mile radius of the urban core where ranch lands are transitioning to urban uses.

III- 3. Comparative Assessment

As might be expected, those subareas that have the highest extent of ranch lands are also those with the highest capacity and conservation potential. These subareas include the Altar Valley, the Empire-Cienega Valley, the Upper Santa Cruz Valley, and the San Pedro Valley.

Those subareas most likely to experience the continued conversion of ranch lands to urban uses include the Middle Santa Cruz Valley, the Tortolita Fan, portions of the Upper Santa Cruz Valley, and portions of the Avra Valley outside the Ironwood National Monument.

While this comparison is presented primarily at the watershed or subarea level, there are clearly areas within each of these valleys where development threats are higher and where conservation potential is higher. Of particular importance are the areas set aside as preserves where grazing will continue as an approved land use. Some of these include National Forest lands in a number of subareas, the Santa Rita Experimental Range in the Upper Santa Cruz

Valley, and the newly established Ironwood National Monument in the Avra Valley. Other portions of these same watersheds are likely to continue to be developed as growth and urban expansion continue. These distinctions are further discussed in the following sections on ranching and ranch lands in the subareas of Pima County.

IV. Ranching in the Subareas of Pima County

Included in this section are the previously published reports that characterize ranching in each of the subareas. These reports are reproduced in their entirety; however, these versions have been revised to correct errors and to reflect new information brought forward by members of the Steering Committee, ranchers, and other subarea stakeholders.

IV-1. Ranching in the San Pedro Valley

Introduction:

Long subject to raiding by Apaches and isolated by the Catalina Mountains from the relative safety of the military presence in the Tucson area, the initial settlement of the San Pedro River Valley with homesteaders and ranchers began somewhat later in this valley than elsewhere. Today the valley is comprised of a number of traditional ranches that continue in operation in this subarea, comprised of approximately 174,315 acres (272.4 square miles) in Pima County.

Land & Environmental Setting:

Located to the east of the Tucson Basin and running parallel to the Santa Cruz valley, the San Pedro River flows north from the border with Mexico to the Gila River. Unlike the urbanized Tucson area and the Santa Cruz River valley, the San Pedro valley is largely rural and undeveloped, with its principal towns at Benson, San Manuel, Mammoth, and at Hayden and Winkelman at its junction with the Gila River. In Pima County, the settlement of Redington is located just east of Redington Pass through the Santa Catalina Mountains. The San Pedro watershed in Pima County includes a portion of the San Pedro River and the uplands of the Santa Catalina Mountains. Bounded by the Pinal County line on the north, Graham County and Cochise County on the east, and the Santa Catalina Mountains and Rincon Mountains on the west and south, this watershed reflects a significant range in elevation from 2798 to 8595 feet.

Table IV-1.1 Major Vegetation Zones in the San Pedro Valley Watershed in Pima County

▸ Irrigated pasture	2131	acres	1.2 percent
▸ Water surface	60		0.1
▸ Cottonwood	661		0.3
▸ Paloverde Scrub	23,083		13.3
▸ Creosote Scrub	8139		4.7
▸ Deciduous/Riparian	1386		0.7
▸ Scrub Grassland	79,709		45.8
▸ Mixed Scrub	5296		3.0
▸ Chaparral Scrub	3330		1.9
▸ Pine Forest	6628		3.9
▸ Mixed Conifer Forest	1087		.6
▸ Oak - Pine Forest	324		0.2
▸ Evergreen Forest	42,481		24.3
TOTAL	174,315	acres	100.0 percent

As shown in the above table, the rugged mountain terrain and river valley support a variety of environmental zones and vegetation types, ranging from the Bingham Cienega swamp along the San Pedro floodplain to high elevation evergreen forests in the Santa Catalina Mountains.

Because of the range in elevation, rainfall, too, is highly variable ranging from about 12-15 inches annually at the lowest elevations to an estimated 35 inches at the highest elevations, with much of this forming snowpack in the winter months at the highest elevations. Most of the rainfall in this watershed is estimated to average about 15 - 25 inches annually. This amount of rainfall covers nearly 90 percent of the subarea acreage.

Water is available from numerous springs found mostly in the mountains on the Coronado National Forest, a number of perennial streams emanating from the mountains, and the San Pedro River itself. Stock tanks in the lower elevations and wells supplement these natural water sources for cattle and wildlife use.

Table IV-1.2 Natural & Constructed Water Sources in the San Pedro Watershed in Pima County

Springs	Streams	San Pedro River	Stock Tanks	Shallow Water	Wells
66	ca. 4mi.	ca. 10 mi.	302	2102 acres	252

As a consequence of its natural environmental setting that includes an abundance of grassland totaling about 46 percent of the vegetation in the valley, numerous natural and created water sources, and a range of environmental zones, which can be seasonally grazed, ranching in the San Pedro Valley watershed comprises a significant and sustainable land use.

Land Base & Land Uses:

All of the San Pedro Valley subarea is located in unincorporated Pima County, and like much of Pima County, the San Pedro Valley is comprised of a mosaic of land ownership including federal, state, and private lands. However, unlike most of the other valleys, there is no BLM land identified in the Pima County GIS system in this subarea, but a significant portion of this land is publicly owned. Approximate acreages are provided below for each kind of ownership.

Table IV-1.3 Land Ownership & Jurisdictions

National Forest	73,032 acres	42 percent
National Parks	8,903	5
State Lands	66,974	38
Private Lands	25,343	15
Unknown	63	
TOTAL	174,315 acres	100 percent

Redington is the principal settlement in the Pima County portion of this watershed, and the total population in the area is estimated at 66. Private lands, comprising some 15 percent of the land base, are located principally along the San Pedro River and in the upper bajada and

foothills area just east of the Coronado National Forest boundary. There are a total of 598 parcels recorded with the Pima County Assessor's Office.

Ranches:

Long subject to raiding by Apaches and isolated by the Santa Catalina Mountains from the relative safety of the military presence in the Tucson area, the initial settlement of the San Pedro River Valley with homesteaders and ranchers began somewhat later in this valley than elsewhere.

First settled by Henry and Lem Redfield in1875, the Redington area just across the mountains to the east of Tucson and along the San Pedro River became the social and economic hub of this portion of Pima County. A number of ranches continue in operation in this subarea, utilizing private lands, state trust land grazing leases, and National Forest leases. These ranches include the following identified by either their ranch name or the name of the grazing lease. Please note that relatively small ranches comprised of only private lands are not noted below; however, their use of private lands in ranching is included in the total acreage in ranch use calculated for the entire watershed.

Table IV-1. 4 Ranches in the San Pedro Watershed in Pima County

Ranch/Lease Name	Private Land	State Lease	National Forest Lease
U Circle Ranch	X	X	X
Finley Springs	X	X	X
4 Lazy B	X	X	
Bingham	X	X	
Bellota (A7)	X	X	X
Bayless & Berkalew	X	X	
Last Chance			X
Barney			X
Fresno	X		X
Happy Valley	X		X
Cumero		X	X

These 11 larger ranches, which include both cow-calf and steer or stocker types of operations, all utilize grazing and ranch management plans under which they implement their state and federal grazing leases. Moreover, a number of these federal ranch leases and management plans have been reviewed and approved pursuant to the National Environmental Policy Act (NEPA).

Unique among the ranches in the San Pedro watershed is the Bellota Ranch, also known as the A7 Ranch, which sits astride Redington Pass. This ranch has been a working ranch since the 1870s, and was once associated with the Agua Caliente Ranch, now a Pima County park, located to the west of Redington Pass. Because of its proximity to the Tucson Basin, the ranch has been subject to increasing development pressures since the late 1970s. Recently the City of Tucson purchased the Bellota Ranch for open space and to preserve grasslands and riparian areas extending from the Coronado National Forest to the San Pedro River. Plans are in progress by the City of Tucson to continue the Bellota (A7) Ranch as a working ranch

and to undertake various range and riparian area improvements to enhance the condition of the ranch. Some of these improvements include extension of pipelines to water sources in upland grazing areas, fencing of pastures, rotational grazing, use of irrigated pasture and the use of fire to restore grasslands. Implementation of these improvements will be directed by a conservation plan currently being developed for the ranch with assistance from the Natural Resources Conservation Service. This plan may consider the establishment of a "grass bank" in portions of the ranch in order to maintain its open space and grazing leases while facilitating a sustainable ranching industry in the San Pedro Valley. At present, the Bellota/A-7 Ranch is comprised of 6,828 acres of deeded lands and 34,186 acres of State Trust grazing leases.

In the San Pedro watershed, covering 174,315 acres in Pima County, ranch lands total approximately 158,674 acres, or about 91 percent of the entire watershed. Of all private lands totaling 25,343 acres, approximately 18,667 acres, or 74 percent, are used in ranching and 6676 acres, about 26 percent, have other uses. Virtually all of the 66,975 acres of state trust lands appear to be used in grazing, and much of the National Forest lands are designated in grazing leases. However, Forest lands used in grazing leases distinguish between "capable" range land and "incapable" range land due to rugged terrain and poor access in the higher elevations. Nominally, however, approximately 73,032 acres of National Forest lands are available for grazing in this watershed.

Table IV-1.5 Ranch lands in the San Pedro Watershed in Pima County

Land Owner	Ranch Use	Non-Ranch Use	Total
National Forest	ca. 73,032 ac	(Rugged terrain?)	73,032 ac
State Trust Land	66,975		66,975
National Park Service		8,903	8,903
Private Owners	18,667	6,676	25,343
Unclassified		62	62
TOTAL	158,674 ac	15,641 ac	174,315 ac

Ranch improvements that have been made include ranch headquarters, residences, stables, corrals, irrigated pasture, fencing for lease boundaries and pasture rotation, roads and fire breaks, erosion control, and development of water resources for cattle and wildlife. While many of 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. It has been noted above in Table 2 that natural water sources are relatively abundant, with 66 springs located mostly on the Coronado National Forest and more than 10 miles of perennial and intermittent streams. To supplement natural water sources, approximately 302 stock tanks have been constructed, and approximately 252 wells, for both domestic use and for cattle and wildlife.

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 US Forest Service 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 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 the San Pedro watershed ranges from 3 to 12 animals per square mile depending on the terrain, location of the lease, the health of the range, rainfall, and how it is used. At the present time the 11 National Forest grazing allotments and 6 State grazing leases allow for a maximum of 1917 animals to be grazed in the entire San Pedro watershed in Pima County. When this number is considered together with the total acreage dedicated to ranching, the maximum average number of animals allowed to be grazed is approximately 8 animals per square mile. Please note again that this number reflects only today's range conditions and lease terms. The total number of animal units is likely to be changed in the future dependent on climate, rainfall, vegetation, and range health.

Table IV-1.6 Animal Units Allowed to be Grazed in the San Pedro Watershed in Pima County

Range of AUs Allowed	Acres/Sq.Miles in Grazing	Total AUs Allowed	Avg.AU/Sq.Mi.
3 -12	158,674 ac. or 248 Sq.Mi.	1917	7.7

In addition to grazing, federal and state public lands may be used for hunting, fishing, hiking, riding, and other recreational uses. Although these kinds of uses have not yet been quantified, it is likely that recreational use in the San Pedro watershed is high due to its close proximity to the Tucson metropolitan area. Moreover, it is likely that recreation here is comparatively higher than in some other areas farther from Tucson.

Current Farms:

At the present time, there are apparently no food or fiber crops being commercially grown in the San Pedro watershed. However, there are some 2131 acres, located principally along the San Pedro floodplain, that are in current use or that may have been used in the past for irrigated pasture. With irrigated pasture producing sufficient alfalfa and other forage, cattle may be pastured together in greater numbers while natural range land is rested from grazing for portions of the year. Water for irrigation to these pastures may be derived from either ditches or canals from the San Pedro River or from wells.

Table IV-1.7 Current Farms or Irrigated Pasture in the San Pedro Watershed in Pima County

Acres in Agriculture	Food or Fiber Crops	Irrigated Pasture	Totals
2131	None	2131	2131

Development Pressure & Threats to Ranching:

Development pressure in the San Pedro Valley watershed in Pima County is now somewhat diminished due to the recent purchase of the Bellota Ranch by the City of Tucson. However, due to its proximity to the Tucson metropolitan area, there remains the threat that additional private lands will be developed either as subdivisions or as wildcat subdivisions. At the present time, there are no formally platted subdivisions in the San Pedro watershed in Pima County; however, there are 598 recorded parcels of land, and 6676 acres of private lands that are not currently used in ranching.

Areas of ranch land fragmentation may be defined as those parcels that are not used in ranching and that have been subdivided or have the potential to be subdivided. When reviewed on a map, these areas of non-ranch private land holdings cluster along the San Pedro River, at the Pinal County line, and to the west adjacent to the National Forest boundary. In addition, there are a number of mining claims that are identified as separate parcels in the highest elevations of the Santa Catalina mountains.

At the present time there are no areas of committed high density zoning for development. 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. Additionally there are no BLM or State Trust Lands that have been identified for either disposal or commercial lease or purchase.

In summary, the development pressure in the San Pedro Valley watershed in Pima County is currently fairly low due to the stability of ranch land use, the lack of committed high density land use, the lack of federal or state lands designated for disposal or commercial use, its distance from any major transportation corridors, and the relatively difficult access by Redington Road to the valley. The principal threat to the stability of ranching in the San Pedro Valley may be due to its relatively close proximity to the Tucson metropolitan area and from further fragmentation of the private lands into either platted or wildcat subdivisions.

Ranch land Conservation Potential:

Several factors will contribute to the very good potential for the San Pedro Valley to remain a viable area for sustainable ranching. These factors include: the relative stability and long-term tenure of ranch lands comprised of private lands, State lands, and National Forest leases; the lack of public lands for disposal or commercial use; low population pressure; the lack of major transportation corridors; relatively difficult or circuitous access to the valley from the Tucson area; its proximity to existing preserves that include the Coronado National Forest, Saguaro National Park, and the Bingham Swamp preserve along the San Pedro River; a high proportion of productive grasslands; good average rainfall; the availability of irrigated pasture to diversify grazing strategies; and relatively high grazing capacity.

While none of these factors guarantees long-term ranch land conservation, the available information suggests that the potential for sustainable ranching is high in the San Pedro watershed in comparison to some of the other subareas of Pima County.

Summary & Conclusions:

To conclude, the San Pedro Valley watershed continues to support stable and sustainable ranching operations in large part because of its environmental setting. The valley is located in a rich and varied environment that expresses a range of environmental zones from riparian bottomlands to high elevation evergreen forests, offering the opportunity to use different areas of the valley for grazing as forage becomes available seasonally. The principal vegetation type is scrub grasslands, which comprises some 46 percent of the major vegetation in the subarea.

Numerous water sources, both natural and constructed, provide water to both cattle and wildlife throughout the watershed in all elevations.

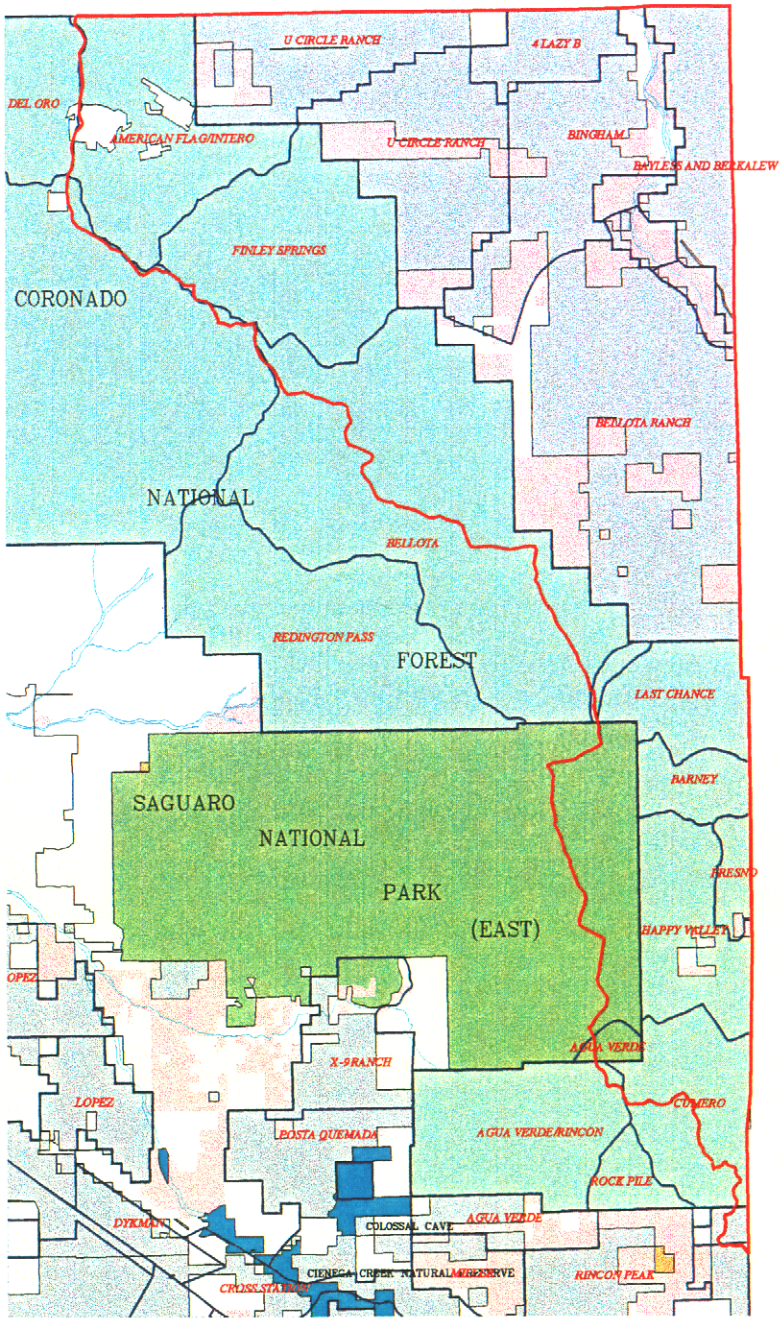
Land use remains entirely rural, and significantly, some 158,674 acres, approximately 91 percent of the land in the subarea, are used in ranching. This includes 18,667 acres, or 74 percent, of all private lands. Only 15,641 acres, or approximately 9 percent, of the entire area is not used for ranch purposes.

At the present time there is no significant threat from development pressure. Population is estimated at only 66 people, and there are no committed lands that have been zoned for high density development. The acquisition of the Bellota Ranch (A7) by the City of Tucson to preserve open space has significantly reduced the threat of urban sprawl across Redington Pass Road. In addition, there are no lands identified by either the BLM or ASLD for sale or lease for commercial purposes.

The San Pedro Valley watershed in Pima County currently has a reasonably high potential to continue in sustainable ranch use. This conservation potential derives from a productive environmental setting, the availability of water and relatively high rainfall, the apparent stability of ranch lands and grazing leases comprised of private lands, State lands and National Forest lands, the relatively high grazing capacity, the lack of public lands for sale or commercial lease, the lack of major transportation corridors, relatively difficult access to the valley, and the valley's proximity to existing preserves, much of which is used in ranching.

Ranch Lands and Grazing Allotments

SDCP PLANNING UNIT 1

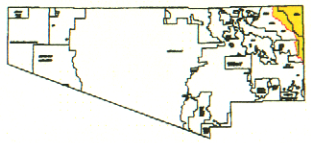


Planning Unit Boundary
Grazing Allotments
Major Washes
BLM
County Park
Indian Lands
Military Reservations
National Forest Lands
National Parks and Monuments
National Wildlife Refuge
Private Lands
State Lands
State Park
Ranch Use

STATISTICS FOR PLANNING UNIT 1

BLM	0 AC
COUNTY PARK	0 AC
MILITARY RESERVATIONS	0 AC
INDIAN LANDS	0 AC
NATIONAL FOREST LANDS	73,032 AC
NATIONAL PARKS AND MONUMENTS	8,903 AC
STATE LANDS	66,975 AC
STATE PARKS	0 AC
PRIVATE LANDS RANCH USE	18,667 AC
PRIVATE LANDS NON-RANCH USE	6,676 AC

Pima County Index Map



Index Map Scale 1:1,500,000

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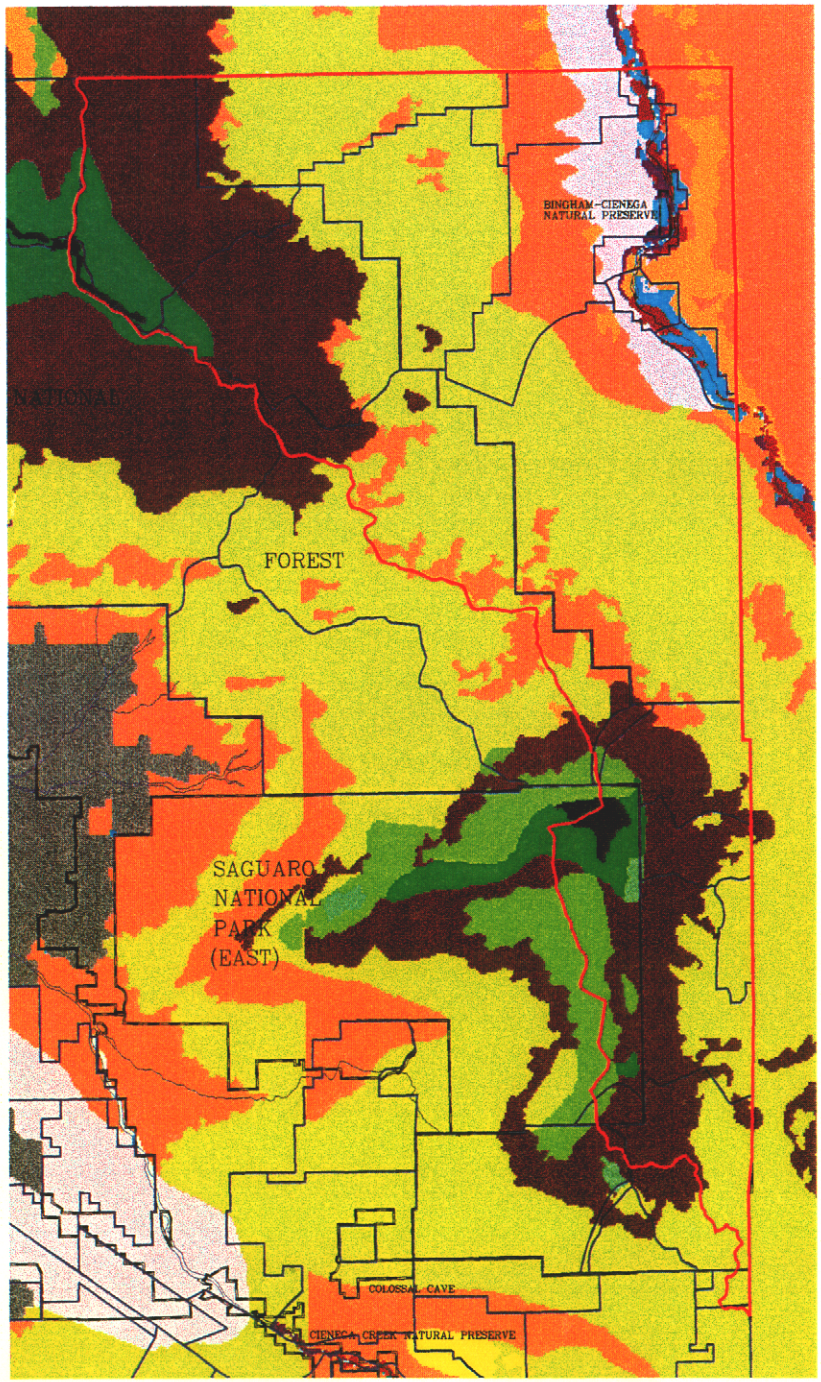
/pygeyowl2/sonora/cultural/esajoined/plan1/aml/ranch_pilot1.aml 7/17/00

GAP Vegetation and Grazing Allotments

SDCP PLANNING UNIT 1



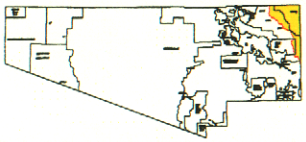
Minimum Elevation: 2798
Maximum Elevation: 8595
****

VEGETATION ACREAGE

ACRES	BIOME (SERIES)
2, 131	Agriculture
42, 481	Madrean Evergreen Forest (Encinal)
324	Madrean Evergreen Forest (Oak--Pine)
1, 087	Madrean Montane Conifer Forest (Douglas-Fir--Mixed Conifer)
6, 628	Madrean Montane Conifer Forest (Pine)
3, 330	Mogollon Chaparral Scrubland (Manzanita)
5, 296	Mogollon Chaparral Scrubland (Mixed Evergreen Sclerophyll)
79, 704	Scrub Grassland (Mixed Grass--Scrub)
1, 386	Sonoran Deciduous Swamp and Riparian Scrub (Mixed Scrub)
8, 139	Sonoran Desertscrub (Creosotebush--Bursage)
23, 083	Sonoran Desertscrub (Paloverde--Mixed Cacti)
661	Sonoran Riparian and Oasis Forest (Cottonwood--Willow)
60	Water

- Watershed Planning Unit Boundary
- Administrative Boundaries
- Washes
- Springs
- Agriculture
- Urban
- Mining
- Chihuahuan Desertscrub (Creosotebush--Tarbush)
- Chihuahuan Desertscrub (Mixed Scrub)
- Chihuahuan Desertscrub (Whitethorn)
- Madrean Evergreen Forest (Encinal)
- Madrean Evergreen Forest (Oak--Pine)
- Madrean Montane Conifer Forest (Douglas-Fir--Mixed Conifer)
- Madrean Montane Conifer Forest (Pine)
- Mogollon Chaparral Scrubland (Manzanita)
- Mogollon Chaparral Scrubland (Mixed Evergreen Sclerophyll)
- Mogollon Deciduous Swampforest (Cottonwood--Willow)
- Mogollon Deciduous Swampforest (Mixed Broadleaf)
- Playa
- Scrub Grassland (Mixed Grass--Scrub)
- Scrub Grassland (Sacaton--Scrub)
- Sonoran Deciduous Swamp and Riparian Scrub (Mixed Scrub)
- Sonoran Desertscrub (Creosotebush--Bursage)
- Sonoran Desertscrub (Paloverde--Mixed Cacti)
- Sonoran Desertscrub (Saltbush)
- Sonoran Interior Marshland (Cattail)
- Sonoran Riparian and Oasis Forest (Cottonwood--Willow)
- Unclassified/Mixed
- Water

Pima County Index Map



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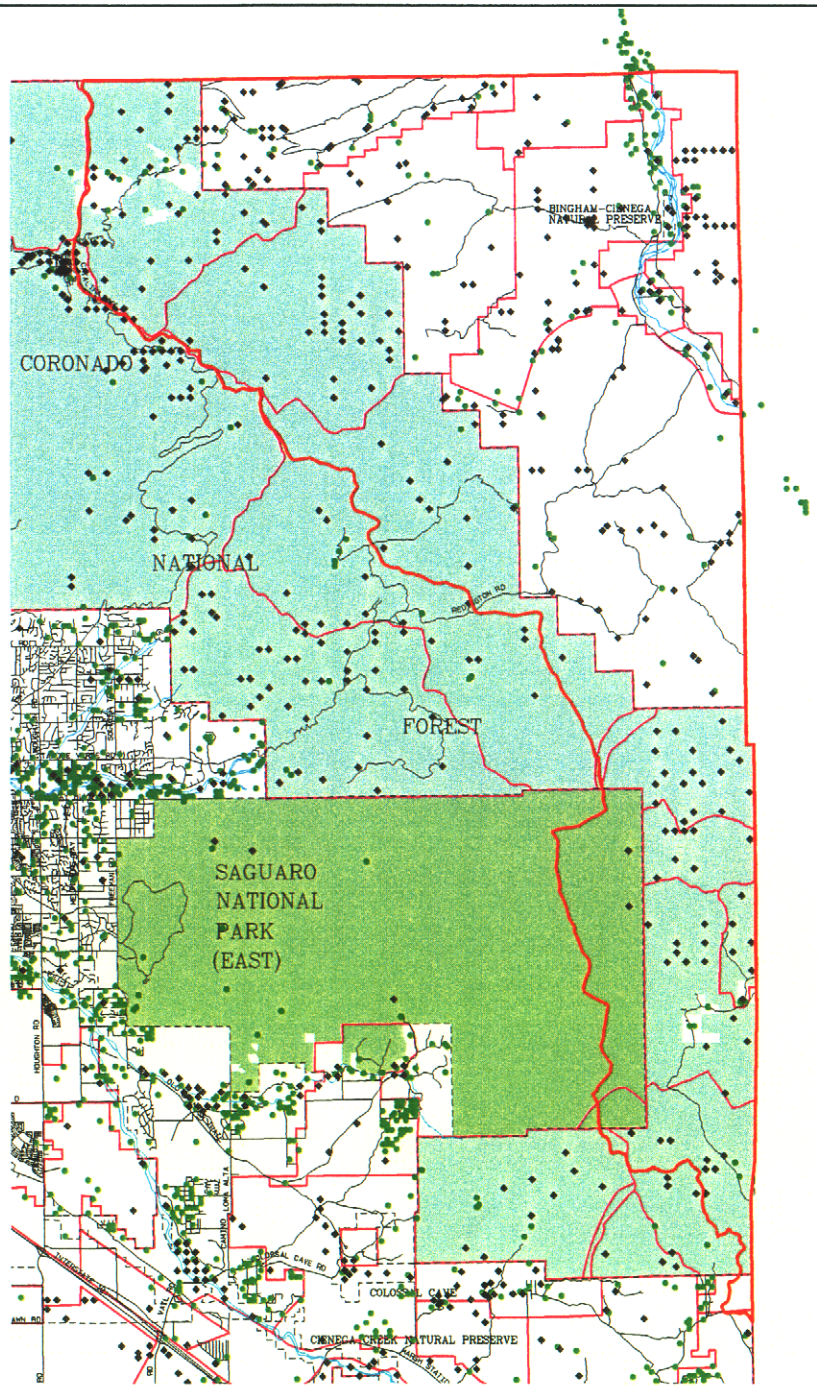
3/6/00

/pygmyowl2/sonora/cultural/asmjoined/plani/covers/ranch_gap.aml

Stock Tanks and Well Sites



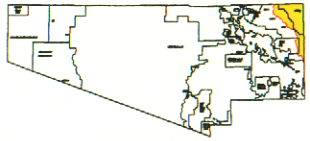
SDCP PLANNING UNIT 1

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

STATISTICS

Well Sites: 252
Stock Tanks: 302

Pima County Index Map



Index Map Scale 1:1,500,000

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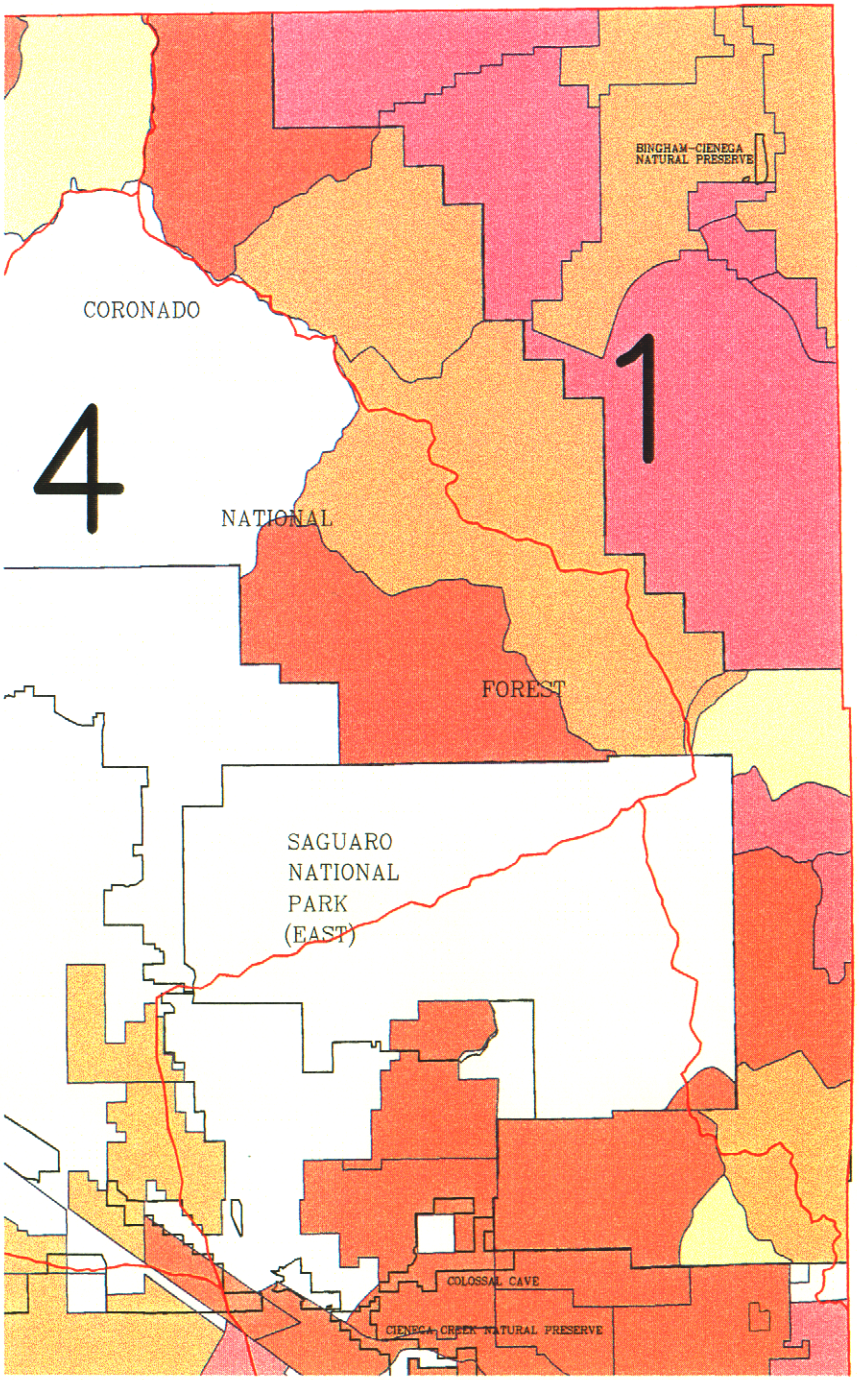
/pygmyowl2/sonora/cultural/asajoined/plani/amls/ranch_tank.aml Plotted 3/6/00



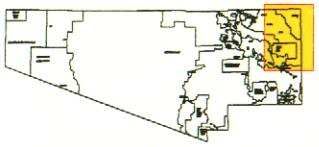
Carrying Capacity per Square Mile by Grazing Allotment

SDCP PLANNING UNIT 1
San Pedro

- 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

Pima County Index Map



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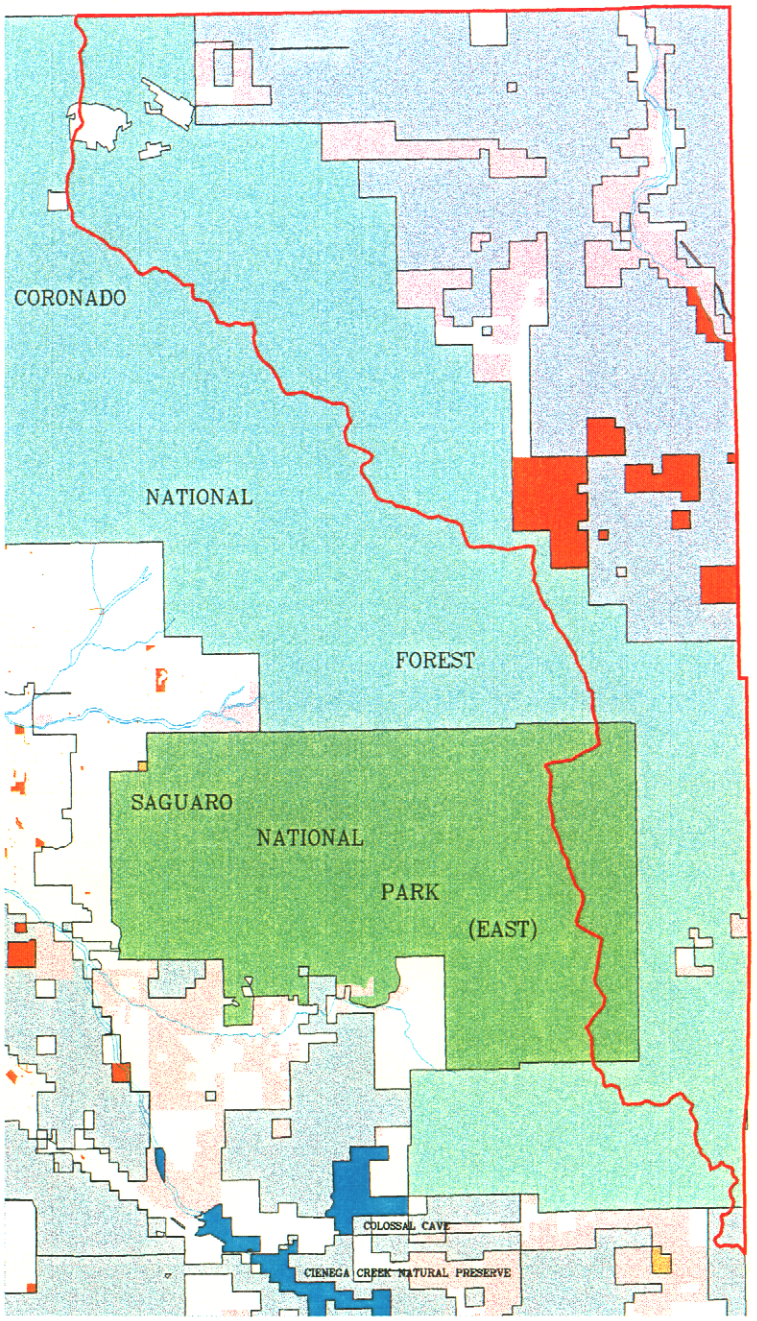
THE SEAL OF PIMA COUNTY ARIZONA

/pygmyowl2/sonora/ranch/covers/spedro_carry.aml Plotted: 3/22/00

City of Tucson Owned Parcels



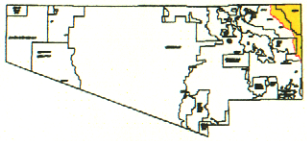
SDCP PLANNING UNIT 1

- Planning Unit Boundary
- Major Washes
- City of Tucson Parcels
- 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

STATISTICS FOR UNIT 1

OF CITY OF TUCSON PARCELS: 15
ACRES OF CITY OF TUCSON OWNED LAND: 6,113

Pima County Index Map



Index Map Scale 1:1,500,000

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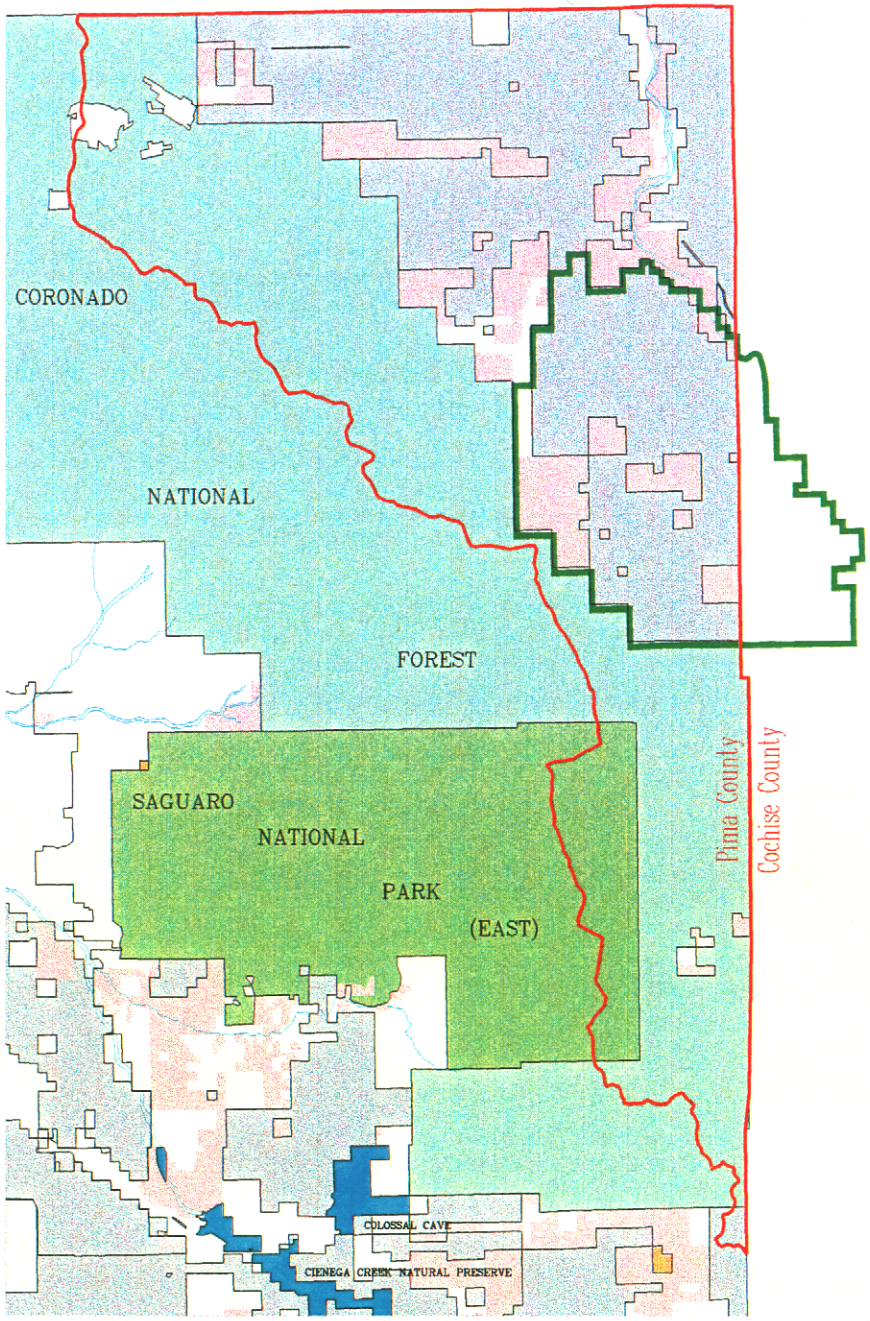
/pyg@yow12/sonora/cultural/esmjoined/plan1/aels/ranch_city1.aml 7/17/00

A7/Bellota Ranch

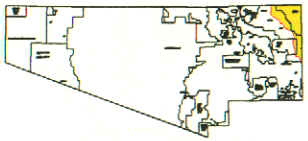


SDCP PLANNING UNIT 1

- A7/Bellota Ranch Boundary
- Planning Unit Boundary
- 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

A7/Bellota Ranch Acreage: 41,303 ac.

Pima County Index Map



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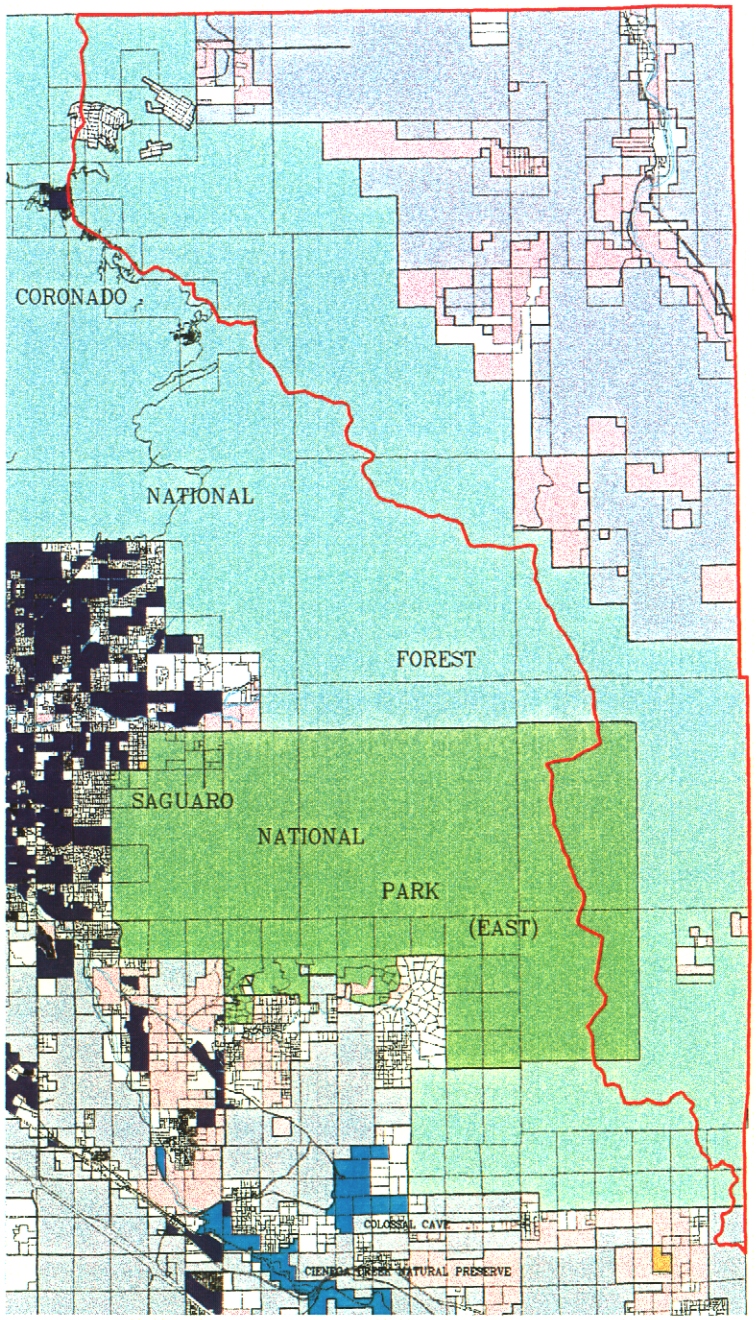
/pyg@yow12/sonora/cultural/asmjoined/plan1/amls/a7_ranch.aml 7/18/00



Platted Subdivisions

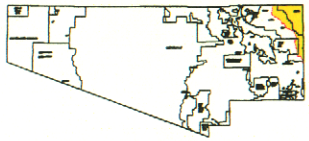
SDCP PLANNING UNIT 1

- 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

STATISTICS FOR UNIT 1

NUMBER OF PLATTED SUBDIVISIONS:	0
ACRES OF PLATTED SUBDIVISIONS:	0
NUMBER OF PARCELS:	554

Pima County Index Map



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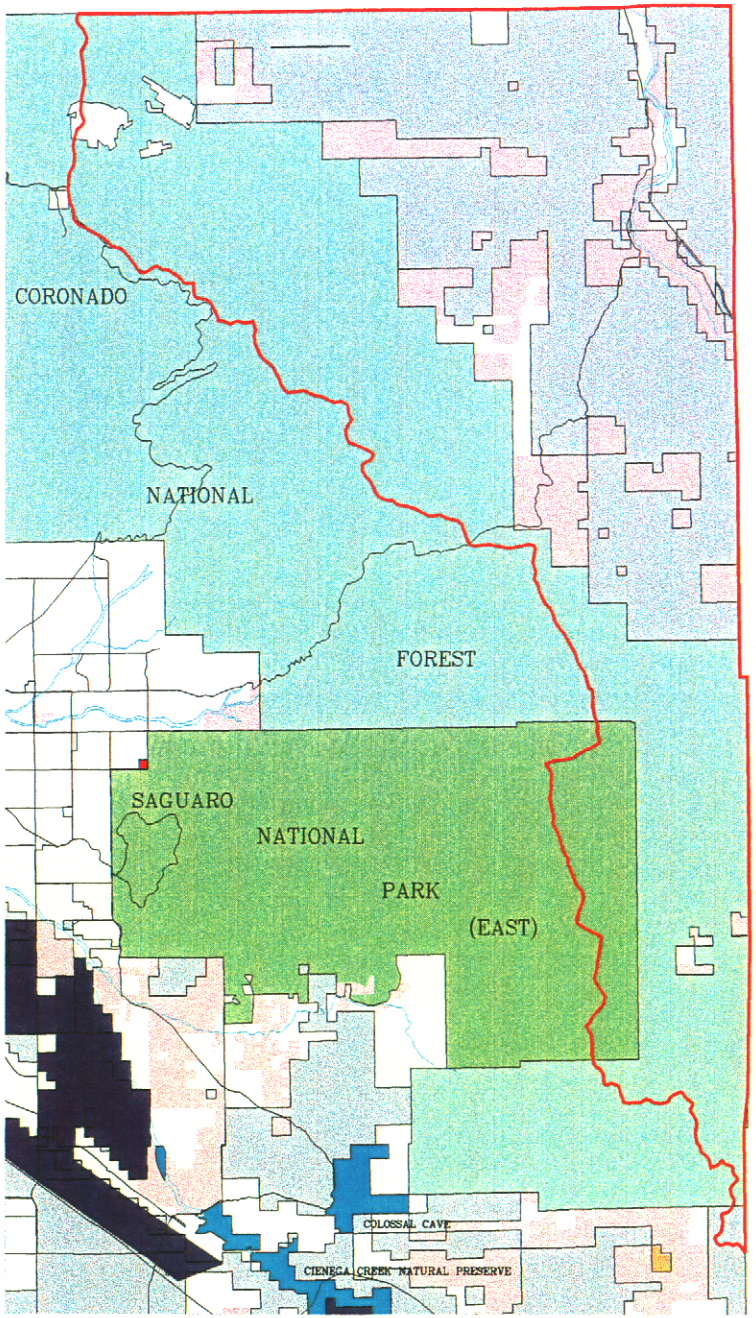
/pydmyowl2/sonora/cultural/esmjoined/plan1/amls/ranch_subi.aml 7/17/00

Disposable Lands for BLM and State of Arizona



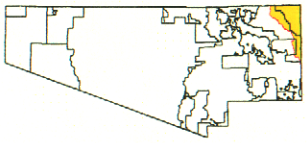
SDCP PLANNING UNIT 1

- Planning Unit Boundary
- Major Washes
- Disposable BLM Land
- Disposable State Land
- 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

STATISTICS FOR UNIT 1

DISPOSABLE BLM LAND:	0 AC.
DISPOSABLE STATE LAND:	0 AC.

Pima County Index Map



Index Map Scale 1:1,500,000

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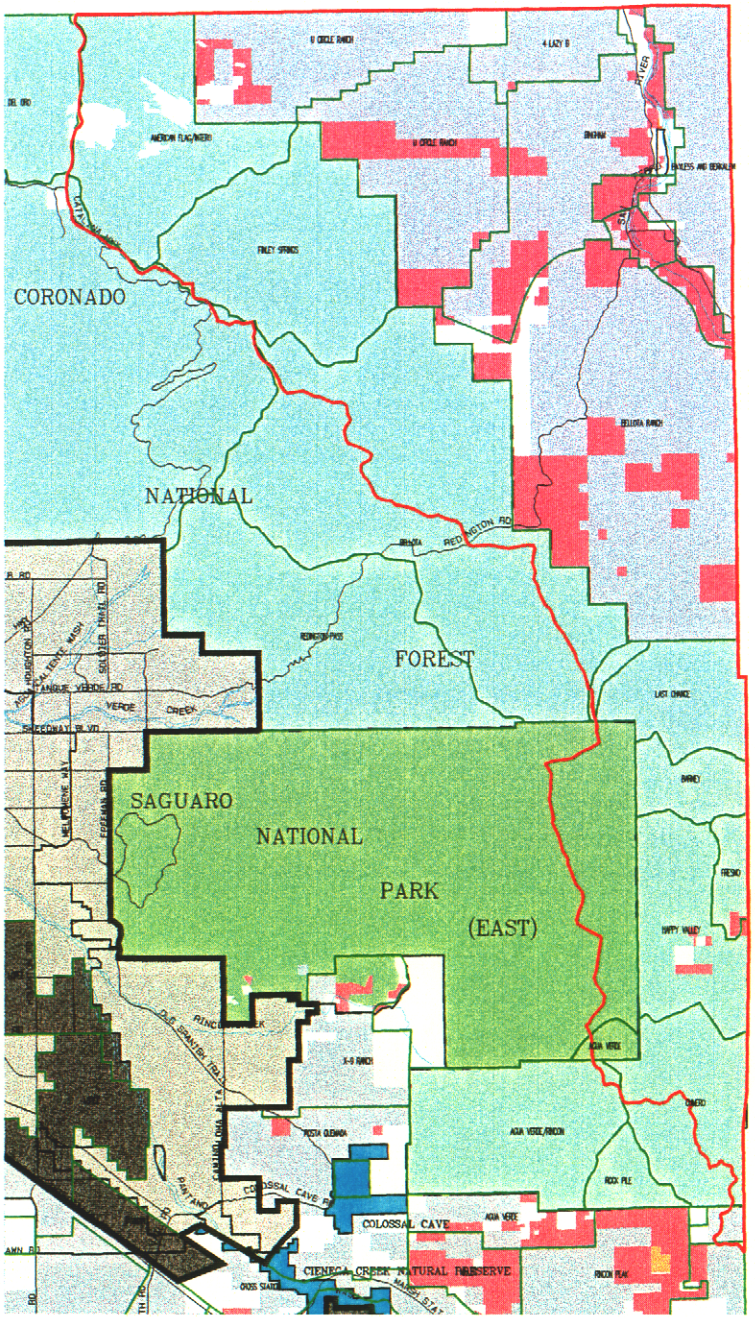
pygmyowl2/sonora/cultural/esmjoined/plani/amls/ranch_disp1.aml 7/17/00

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



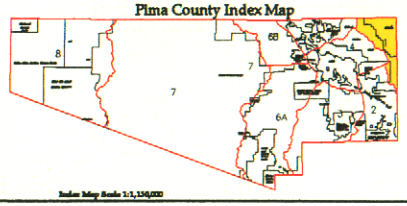
SDCP PLANNING UNIT 1

- 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 LANDS
- STATE PARK
- RANCH USE
- AGRICULTURAL USE
- Urban Boundary
- ASLD / SLUP's

STATISTICS FOR UNIT 1

ACRES OF ASLD/SLUP's 0

Pima County Index Map



Index Map Scale 1:1,150,000

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/pygsyow12/sonore/cultural/msmjoined/plan1/smls/ranch_urban1.smPlotted: 7/17/00

IV-2. Ranching in the Empire-Cienega Valley

Introduction:

The Empire-Cienega Valley was historically one of the most significant ranching valleys in eastern Pima County. Today it remains largely rural, and is characterized by significant unfragmented expanses of natural open space, comprised principally of ranch lands and public preserves. Once threatened by massive development, the potential for the valley to retain its natural open space and ranching tradition is today greatly enhanced by efforts by Pima County and Santa Cruz County and the Bureau of Land Management to consolidate public ownership of the Empire-Cienega Ranch for conservation purposes.

Proposed for development in 1969 by the Gulf America Corporation (GAC), the Empire-Cienega ranches then comprised about 90 square miles in Pima and Santa Cruz counties, which GAC proposed to develop into a "satellite community" for a population of 180,000 residents. Concerns about impacts to ground-water, transportation, services, and environmental impacts resulted in one of Pima County's biggest development battles, with ranchers and evironmentalists joining together in the opposition. Although portions of the Empire Plan were approved, no construction was begun, and the bankruptcy of GAC forced the sale of the Empire and Cienega ranches. These were purchased by Anamax Mining Company, which abandoned the GAC plans and later put the ranches up for sale. In 1986, Pima County contemplated acquisition of these ranches as floodprone lands to assist in controlling downstream urban flooding problems and to conserve ground-water. In 1988, through subsequent land exchanges, the BLM acquired roughly 42,000 acres of these deeded lands and assumed management of another 57,000 acres of state trust grazing lands that it manages as a resource conservation area and leases to local ranchers for livestock grazing.

Farther downstream in the Empire-Cienega valley, Pima County established Colossal Cave Mountain Park and Cienega Creek Preserve and acquired the nearby Posta Quemada and Empirita ranches, which are also leased as working cattle ranches. The acquisition of these ranches by BLM and Pima County marked the beginning of local efforts to control urban sprawl, maintain open space, continue sustainable ranching, allow public recreation, and protect cultural and natural resources.

Because of the valley's unique environmental qualities, including two of southern Arizona's perennial streams, the Secretary of Interior visited the Empire-Cienega Resource Conservation Area in January 1999 to consider the effort to establish a National Conservation Area (NCA). Since that time, Congressman Jim Kolbe and his staff have been working with the community and the Sonoita Valley Planning Partnership to develop legislation to establish the Las Cienegas National Conservation Area. This legislation (HR 2941) was introduced on September 24, 1999. If approved, the Las Cienegas NCA would protect more than 300 square miles, some 200,000 acres, in the Cienega Creek and Babocomari River watersheds, while allowing responsible and sustainable livestock grazing and recreation to continue.

As a consequence of these actions by Congressman Kolbe, the BLM, Pima County, Santa Cruz County, and local residents, a significant portion, some 63 percent of the land area of the Empire-Cienega Valley is likely to be conserved for its natural and cultural values and open space, while providing a working landscape for ranching and livestock grazing.

Historical Summary:

The initial occupation of the valley by the prehistoric Archaic peoples dates perhaps as early as 8500 B.C., and while there are no Paleoindian occupation sites that have been identified, Paleoindian use of the valley perhaps as early as 10,000 B.C. is suggested by the presence of at least one isolated Clovis projectile point found in the eastern edge of the Santa Rita Mountains. More than 600 archaeological and historical sites have been found in the Empire-Cienega valley, dating to the Archaic, Early Agricultural, Hohokam, Protohistoric and Historic periods. A substantial number of these sites date to the Archaic period, followed by the Hohokam who occupied villages and smaller hamlets from about A.D. 300 to 1450 and farmed along the Cienega Creek floodplain and near spring sites in the adjacent mountains. Following the Hohokam collapse, little is known of the area until the Spanish missionaries and explorers entered the region in the 1690s and encountered Piman or Tohono O'odham peoples who are likely to be the descendants of the Hohokam. Arriving about the same time as the Spanish, the Apache, too, frequented southeastern Arizona, which later became part of the homeland of the Chiricahua Apache.

With the acquisition of this region by the United States following the 1854 Gadsden Purchase, some of the first Americans to enter the area were prospective miners in search of gold and silver. Lured to the region by Spanish accounts of rich ore bodies and the discovery of gold and silver elsewhere in southern Arizona, prospectors staked numerous small claims in the Santa Rita and other nearby mountain ranges; however, because of increased Apache raiding, mining, ranching, and agriculture in the Empire-Cienega valley was nearly precluded until after the Civil War. Settlement of the Empire-Cienega Valley with miners, homesteaders, and ranchers began in earnest in the 1870s when mines were re-opened and new mines developed and ranches were established under the Homestead Act of 1862 and the Desert Land Act of 1877. In 1874, the Greaterville gold placers were located, and by the late 1870s copper was being exploited at Helvetia, Twin Buttes, Silverbell, and elsewhere. The first mine in the Rosemont area was the Narragansett in 1879. With the coming of the railroad through the northern part of the valley in 1880, miners and ranchers were able to ship ore and livestock to distant markets, further encouraging the development of mining and ranching in the valley.

Good grass and permanent water attracted cattlemen and sheepmen to the Empire-Cienega Valley that was initially called "Stock Valley." Sanford, Kane, and Gardiner started some of the first ranches there, but certainly of greatest importance to the history of the Empire-Cienega Valley is the establishment of the Empire Ranch by Edward Nye Fish. Initially comprised of only 160 acres in 1870, Walter Vail, in partnership with Herbert Hislop, purchased the Empire Ranch and 612 head of cattle in 1876 and began an aggressive expansion of his ranch holdings. Vail continued to buy up surrounding ranches until the Empire Ranch controlled nearly one thousand square miles of range stretching from the Mexican border to the Rincon Mountains. More than 50,000 head of cattle grazed on the Empire Ranch at its height of operation. Vail understood that to get a good return in Western ranching, one had to make a sizable investment in land, cattle, and improvements. A shrewd businessman, Vail expanded his vast land base and operated the Total Wreck Mine, which yielded substantial wealth in silver and allowed Vail to diversify his holdings. Like his land holdings, Vail also created an expansive ranch headquarters as more space was needed and as a reflection of his growing wealth. Today, the ranch headquarters survives and is listed on the National Register of Historic Places. In 1928, the Vail family sold the Empire Ranch to the Boice family, owners of the Chiricahua Cattle Company, who ran the ranch for 40

years until it was sold to the Gulf American Corporation for development in 1969. Today, the Empire-Cienega valley continues its ranching tradition and is home to about 28 ranches, including the lands that once comprised the Empire Ranch. The valley is comprised of 318,535 acres (497.7 square miles).

Land & Environmental Setting:

Located to the southeast of the urban Tucson Basin and running parallel to the Santa Cruz valley, the Cienega Creek in the Empire-Cienega Valley flows north from its headwaters near a divide to the east of Sonoita in Santa Cruz County. It continues to flow north into Pantano Wash and then the Rillito River, which joins the Santa Cruz River. Fortunately, erosion and significant flooding events have not caused the Cienega Creek in its upper reaches to become deeply channelized as has occurred in other valleys. Unlike the urbanized Tucson area, the Empire-Cienega valley is largely rural and undeveloped with an estimated population of only 3312 people. Its principal settlements are located at Vail, Mescal, and Sonoita, just south of the Pima County line. There are no Indian lands; however, public preserves comprise a significant portion of the valley. Suburban areas in the northwest portion of the subarea adjacent to the Tucson metropolitan area represent the only urbanized areas in the valley.

The Empire-Cienega Valley is bounded by Saguaro National Park - East on the north, the Cochise County line and the Whetstone Mountains on the east, the Santa Cruz County line and the Sonoita area on the south, and the Santa Rita Mountain Range and the Empire Mountains on the west. The Empire-Cienega Valley watershed reflects a significant range in elevation from 2848 to 8596 feet. The rugged mountain terrain and river valley support a variety of environmental zones and vegetation types, ranging from the Cienega Creek floodplain to higher elevation evergreen forests of the Santa Rita, Rincon, and Whetstone mountain ranges that surround the valley. Much of the valley is characterized by a broad, gently sloping bajada that accommodates broad expanses of grasslands that extend into the foothills of the surrounding mountain ranges.

Table 1. Major Vegetation Zones in the Empire-Cienega Valley Watershed in Pima County

▸ Agriculture/Pasture	1,042 acres	0.3 percent
▸ Urban	693	0.2
▸ Mixed Scrub	4,330	1.3
▸ Water surface	485	0.1
▸ Creosote-Tarbush	13,216	4.1
▸ Cottonwood-Willow	1,585	0.5
▸ Paloverde Scrub	25,431	8.0
▸ Creosote-Bursage	8,750	2.7
▸ Deciduous/Riparian	279	0.0
▸ Scrub Grassland	222,876	70.0
▸ Mixed Broadleaf	131	0.0
▸ Manzanita	5,626	1.7
▸ Oak- Pine Forest	10,096	3.2
▸ Evergreen Forest	23,995	7.5
TOTAL	318,535 acres	99.6 percent

Because of the range in elevation, rainfall, too, is highly variable ranging from about 13 inches annually at the lowest elevations to an estimated 31 inches at the highest elevations. Most of the rainfall in this watershed is estimated to average about 15 - 23 inches annually. This amount of rainfall covers nearly 92 percent of the subarea acreage.

Water is available from a number of springs found mostly in the Santa Rita and Empire mountains on the west side of the valley and in the Whetstone Mountains to the east and the Rincon Mountains on the north. Surface water covering some 485 acres is found along some 77 miles of perennial and intermittent streams that include Cienega Creek, Davidson Canyon, Pantano Wash, Mescal Arroyo, Agua Verde Creek, Posta Quemada Creek, and Rincon Creek. Shallow ground water has been identified in 8387 acres of the valley. Numerous stock tanks and wells supplement these natural water sources for cattle and wildlife use. Domestic wells account for approximately 141 wells that are recorded with the Arizona Department of Water Resources.

Table IV-2. 2 Natural & Constructed Water Sources in the Empire-Cienega Watershed

Springs	Intermit-Streams	Peren-Strms	Surf. Water	Stock Tanks	Shallow Grnd-Water	Wells
55	ca. 60 mi.	ca. 17 mi.	485 ac	587	8387 acres	1196

As a consequence of its natural environmental setting that includes an abundance of grassland totaling about 70 percent of the major vegetation type in the valley, numerous natural and created water sources, and a range of environmental zones, which can be seasonally grazed, ranching in the Empire-Cienega Valley watershed continues to be a significant and sustainable land use.

Land Base & Land Uses:

Nearly all of the Empire-Cienega Valley subarea is located in unincorporated Pima County, except for the northwest portion of the subarea largely to the west of Pantano Wash, which has been annexed into the City of Tucson. The balance of the watershed, like much of Pima County, is comprised of a mosaic of land ownership including federal, state, and private lands, and a significant portion of this land is publicly owned. Approximate acreages are provided below for each kind of ownership.

Table IV-2.3 Land Ownership & Jurisdictions in the Empire-Cienega Valley

National Forest	53,715 acres	16.8 percent
National Parks	30,866	9.7
Pima County	5,910	1.8
BLM	36,741	1.5
State Lands	125,584	39.4
Private Lands	65,703	20.6
Unknown	16	0.0
TOTAL	318,535 acres	99.8 percent

Vail, Mescal, and Sonoita in Santa Cruz County are the principal settlements in the Empire-Cienega Valley watershed, and the total population in the entire valley is currently estimated at only 3,312 people. Private lands, comprising some 21 percent of the land base, are located throughout the valley. While some 48 percent of these private lands, 31,398 acres, are classified as used for ranching or agricultural purposes, some 52 percent, 34,305 acres, of all private lands are categorized as non-agricultural lands.

A significant area of these non-ranching private lands characterizes much of the northwest portion of the subarea within and adjacent to the City of Tucson boundary and the Interstate 10 corridor. This area, which is experiencing urbanization from the Tucson metropolitan area, essentially marks where the transition from ranching to real estate development is occurring. Some of these lands such as the Rocking K and Vail Valley Ranch Specific Plan areas have been zoned for high density development and formally platted, and other areas in the valley reflect both formal subdivisions and lot-splitting or wildcat subdivision areas.

Elsewhere in the Empire-Cienega Valley, clusters of private lands that are not used for ranching are found to the east of Highway 83 and northwest of the Empire Mountains in the area to the south of the interchange at I-10 and Highway 83. Other clusters occur near Mescal along the I-10 corridor and to the south of the Whetstone Mountains. There are a total of 5704 parcels and 41 subdivisions recorded with the Pima County Assessor's Office. Platted subdivisions cover some 7209 acres.

Ranches:

As noted earlier, much of the Empire-Cienega Valley was utilized by Apache bands, and no permanent O'odham or Spanish settlements were established here. It was not until the Gadsden Purchase of 1854 that the Empire-Cienega Valley experienced its first significant wave of immigrants who were largely American mining prospectors; however, permanent settlement of the region did not occur until after the Civil War.

With the establishment of the Butterfield Stageline and later the Southern Pacific Railroad in 1880 across the northern portion of the valley, the Empire-Cienega Valley became more easily accessible for exploration and settlement. With the success of the Empire Ranch and local silver, gold and copper mines at Greaterville, Total Wreck, and Rosemont, the rail stop at Vail provided rail access to ranchers and miners who could ship cattle and ore to distant markets. This resulted in greatly increased productivity in ranching and great wealth for those ranchers like Walter Vail who had the foresight to buy land, water, and mineral rights to expand and diversify their holdings. The principal routes in the valley, the east-west I-10/railroad corridor and the north-south State Highway 83 reflect these early routes of travel and shipping.

Much of the original Empire Ranch continues to be used in ranching. Today, some 28 ranches, many of which include lands from the original homesteads and the Empire holdings, continue in operation in this subarea. Lands used in ranching include some 31,398 acres of private lands, 25 state trust land grazing leases, 4 state trust land grazing permits, about 16 BLM leases of various parcels, and 14 National Forest leases.

These ranches are listed in the following table and are identified by either their ranch name or the name of the grazing lease. Please note that relatively small ranches comprised of only

private lands are not noted below; however, their use of private lands in ranching is included in the total acreage in ranch use calculated for the entire watershed.

The larger ranches, which include principally cow-calf and some steer or stocker types of livestock operations, all utilize grazing and ranch management plans under which they implement their state and federal grazing leases.

Table IV-2.4 Ranches in the Empire-Cienega Valley Watershed in Pima County

Ranch/Lease Name	Private Land	State Lease	BLM	National Forest Lease
Agua Verde	X	X		X
Andrada*	X	X		
Apache Springs				X
Cienega Creek	X	X	X	
Clyne		X		
Cross Station	X	X		
Cumero*				X
Dykman*		X		
Empire	X	X	X	
Empirita	X	X	X	
Gardner Canyon	X			X
Jay - Six	X	X		
L Pierce		X		
Lopez*		X		
M Pierce		X		
Martin Cattle Co.	X	X		
Martin	X	X		
Mescal				X
Miller	X	X		
Oak Tree				X
Posta Quemada	X	X		
Rincon Peak	X	X	X	X
Rosemont	X	X	X	
Sands Ranch	X	X		X
Sullivan	X	X		
Thurber	X			X
Willow Springs*				X
X-9 Ranch	X	X		

* Indicates ranches that overlap into adjacent watersheds.

Except for Saguaro National Park, the Cienega Creek Preserve, and Colossal Cave Park, platted and wildcat or lot-split subdivision areas, and the townsite areas, the Empire-Cienega Valley watershed has 243,758 acres of ranch or agricultural lands, or about 77 percent of the entire watershed. Lands not used in ranching or agriculture comprise some 74,777 acres or about 23 percent of the Empire-Cienega Valley watershed.

Of all private lands in the Empire-Cienega Valley totaling 65,703 acres, approximately 31,398 acres, or 48 percent, are used in ranching, and 34,305 acres, or about 52 percent, have

other uses. Virtually all of the state trust lands, except for about 1400 acres, appear to be used in grazing, much of the BLM lands, except for 2280 acres, and National Forest lands totaling some 53,715 acres are designated in grazing leases. Forest lands used in grazing leases distinguish between "capable" range land and "incapable" range land due to rugged terrain and poor access in the higher elevations. For the purposes of this analysis, however, it is assumed that approximately 53,715 acres of National Forest lands are available for grazing in this watershed.

Table IV-2.5 Ranch lands in the Empire-Cienega Valley Watershed in Pima County

Land Owner	Ranch Use	Non-Ranch Use	Total
National Forest	53,715 ac	(Rugged terrain?)	53,715 ac
State Trust Land	124,184	1,400	125,584
County Park		5,910	5,910
BLM Lands	34,461	2,280	36,741
National Parks		30,866	30,866
Private Owners	31,398	34,305	65,703
Unclassified		16?	16
TOTAL	243,758 ac	74,777 ac	318,535 ac

Ranch improvements that have been made include ranch headquarters, residences, stables, corrals, irrigated pasture, fencing for lease boundaries and pasture rotation, roads and fire breaks, erosion control, and development of stock tanks and wells as water resources for cattle and wildlife. While many of 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. It has been noted above in Table 2 that natural water sources are relatively abundant in the mountain areas, with 55 springs located mostly in the surrounding mountains, and there are about 77 miles of perennial and intermittent streams. To supplement natural water sources, approximately 587 stock tanks have been constructed over time. Wells, recorded for both domestic use, for cattle and wildlife, and other uses number 1196 for the entire Empire-Cienega Valley.

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 US Forest Service, 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 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 the Empire-Cienega Valley watershed ranges from 3 to 16 animals per square mile depending on the terrain, location of the lease, the health of the range, rainfall, and how it is used. At the present time the 14 National Forest grazing allotments, 16 BLM leases, and 29 State grazing leases or permits allow for a maximum of 4250 animals to be grazed in the entire Empire-Cienega Valley watershed in Pima County. When this number is considered together with the total acreage of 243,758 acres or 381 square miles, dedicated to ranching, the maximum average number of animals allowed to be grazed is approximately 11 animals per square mile. Grazing capacity corresponds with higher elevation and rainfall as shown on the enclosed figure. However, please note again that this number reflects only today's range conditions and lease terms. The total number of animal units is likely to be changed in the future dependent on climate, rainfall, vegetation cover, and range health.

Table IV-2.6 Animal Units Allowed to be Grazed in the Empire-Cienega Valley

Range of AUs Allowed	Acres/Sq.Miles in Grazing	Total AUs Allowed	Avg.AU/Sq.Mi.
3 - 16	243,758 ac. or 381 Sq.Mi.	4250	11.1

In addition to grazing, federal and state public lands may be used for hunting, fishing, hiking, riding, and other recreational uses. Although these kinds of uses have not yet been fully quantified, statistics provided by the BLM indicate that a sample of nearly 6600 visitors signed-in just at the Empire Ranch between 1993-1998. While this number appears to be quite low for a five year period, it is likely that recreational use of the Empire-Cienega Valley watershed is actually much higher. The BLM acknowledges that this is not an accurate count, but is useful as an indicator of recreational uses. If this represents even a 50 percent sample, there may be approximately 2650 visitors to the Empire Ranch area annually.

Current Farms:

At the present time, there are only very limited areas where irrigated agricultural lands are noted. Available GIS data for vegetation suggest there are some 1115 acres of land that were once irrigated for crops and pasture in the Empire-Cienega Valley. However, current Assessor records show only 60 acres classified for agricultural use today, and that 689 acres once in production are no longer in agricultural use. While these data do not fully agree, it may be concluded that irrigated agriculture was never a predominant land use. GIS data suggest that irrigated farms once occurred at the Rincon Creek and Cienega Creek confluence, near Vail, and along the Cienega Creek at Empirita Ranch and elsewhere. Using Assessor records, the total area in the Empire-Cienega Valley that was ever in agricultural use as croplands or irrigated pasture was 749 acres. Approximate acreages for current and historically irrigated agricultural lands are provided below.

Table IV-2.7 Current Farms or Irrigated Pasture in the Empire-Cienega Valley in Pima County

Acres Ever in Agriculture	Food or Fiber Crops	Irrigated Pasture	COT parcels/farms
749 ac*	?	60 ac	162 ac

* GIS vegetation data suggest 1115 acres.

Development Pressure & Threats to Ranching:

Development pressure in the Empire-Cienega Valley watershed in Pima County is variable, but certainly dependent on transportation corridors, proximity to the urbanizing Tucson area, and in areas adjacent to existing platted or wildcat subdivisions. As noted above, growth and urbanization is greatest in the northwest portion of the watershed near the Tucson City limits. Here, the specific plan areas for Rocking K Ranch and Vail Valley Ranch, totaling about 6220 acres, will result in the eventual development of these and adjacent areas into residential and commercial uses. While some of these lands are still grazed, ranching will not be viable for long as the transition of ranch lands to real estate continues to increase.

In fact, there are no long-term State or BLM grazing leases in the northwest portion of the watershed area, and it is just those ranches and grazing leases that adjoin the urban area that are most vulnerable to development. With increasing land values in these areas and higher development potential, the State Land Department has established 5 year time limits on 16 grazing permits called Special Land Use Permits (SLUPs) throughout the metropolitan area. These lands have been essentially reclassified for commercial use by the ASLD in anticipation of sale or lease of these lands for commercial or residential development. Portions of six state SLUPs for grazing, known as the Dykman, Lopez, Martin, and Jay-6 Ranch permits, occur in this subarea. The two Lopez grazing SLUPs totaling some 9111 acres are located within the incorporated boundaries of the City of Tucson and partially in the Empire-Cienega watershed. The Dykman SLUP totaling 2156 acres is located along the I-10 corridor just south of the Lopez SLUPs, and is partially within the City of Tucson incorporated limits and partially within the Empire-Cienega watershed. The Martin SLUP of 1349 acres lies south of Cienega Creek and north of I-10. The two Jay-6 SLUPs totaling 1913 acres of State land occur within the Empire-Cienega Valley on the far eastern end of Pima County along the I-10 corridor. Under the terms of the SLUP, the rancher can be evicted in 30 days even if the 5 year permit is still current, and there will not be any reimbursements for any improvements to the land, as is customary for long-term grazing leases. Should these State SLUPs be sold or leased for development, a total of 14,530 acres of State land straddling the Empire-Cienega Valley and the Middle Santa Cruz Valley and within the Empire-Cienega Valley will be removed from grazing use, diminishing the animal unit capacity regionally by about 180 head of livestock.

As a consequence of existing, planned, and anticipated development, the "urban boundary" in the northwest portion of the Empire-Cienega Valley may be defined by the boundaries of Saguaro National Park, the X-9 Ranch, and the Posta Quemada Ranch. However, as development continues along the I-10 corridor, these northern ranch areas may become increasingly isolated from ranching areas to the south.

At the present time, there are 41 platted subdivisions comprising some 7209 acres in the entire Empire-Cienega Valley watershed in Pima County, and there are a total of approximately 5704 recorded parcels of land. Approximately 692 acres have already been characterized as urbanized area in this portion of the Empire-Cienega Valley.

Areas of ranch land fragmentation may be defined as those parcels that are not used in ranching and that have been subdivided or have the potential to be subdivided. Approximately 34,305 acres, or 52 percent, of all of private lands are currently not used in ranching and may be developed. When reviewed on a map, these areas of non-ranch private land holdings cluster in the urbanizing northwest portion of the watershed including the Rocking K and Vail Valley Ranch specific plan areas, to the east at Jay-6 Ranch, at the "New

Tucson"subdivision north of Sahuarita Road, in the subdividing area northwest of the Empire mountains, near Gardiner Canyon, and near Vail, Mescal, and Sonoita. With these exceptions, the Empire-Cienega Valley is comprised of largely unfragmented ranch lands south of I-10 and east of the Empire Mountains. This natural open space comprising much of the proposed National Conservation Area is extensive and uninterrupted, crossing the valley from east to west to the boundaries of the National Forest and from north to south from the Rincon Mountain Wilderness Area south to Santa Cruz County.

At the present time, there are two Pima County Specific Plan areas, Rocking K Ranch (4438 acres) in the vicinity of Rincon Creek and Vail Valley Ranch (1782 acres) north of the Vail townsite, that will be eventually developed into planned communities comprised of mixed residential, commercial, and resort oriented uses. Portions of these specific plan areas are currently leased for grazing, where the developer retains and uses ranch land designation by the Assessor's Office to lower property taxes while waiting for the opportune time to develop the area for high density residential or commercial use. When developed, nearly 6220 acres will be converted from grazing to planned community development.

In addition to the proposed specific plan areas and existing subdivisions, the Arizona State Land Department (ASLD) has identified various parcels for either sale, trade, or commercial lease that total some 7857 acres in this watershed. While the BLM has parcels located throughout the valley, the proposed Las Cienegas NCA, if approved, will incorporate these parcels into a long-term conservation area.

As for State Trust Land, the ASLD has identified four Special Land Use Permit (SLUPs) areas located in the developing northwest portion of the watershed and one at the eastern end of the watershed. As described above, these State SLUPs are grazing lands in transition that have been reclassified by ASLD for commercial use. These State lands comprise some 7857 acres within the watershed. While virtually all of the BLM land is likely to remain in ranch use or as open space due to the proposed establishment of the Las Cienegas NCA, there is a much higher probability that the ASLD parcels identified for commercial use will be developed because of their proximity to the developing urban area and their location along the I-10 corridor.

In summary, the development pressure in the Empire-Cienega Valley watershed in Pima County is variable at the current time. In the southern and middle portions of the Empire-Cienega Valley, development pressure is relatively low due to the stability of ranch land use, largely unfragmented private and public lands, the lack of committed high density zoning, and the distance from any major transportation corridors such as Interstate 10 or even the Sonoita Highway. The principal threat to the stability of ranching in these portions of the valley is likely to be due in the future to the transition of private ranch lands to real estate, especially in the areas adjacent to existing development and the Sonoita Highway.

In the northern portion of the Empire-Cienega Valley, urbanization is occurring near the Tucson City limits and in the vicinity of the Rocking K Ranch and Vail Valley Ranch specific plan areas, and along the I-10 corridor. A land value analysis was recently completed for this assessment that demonstrates that land values are increasing and sufficiently high in these areas that private land owners are selling land for development rather than retaining their land for agricultural or ranching use. Generally land values are highest in the platted subdivision and specific plan areas north of I-10 and lowest in the lot-split subdivisions farther to the south.

Ranch land Conservation Potential:

The establishment of the Las Cienegas National Conservation Area will contribute greatly to the potential for much of the Empire-Cienega Valley to remain a viable area for sustainable ranching. Other factors that support sustainable ranching in the proposed NCA include the relative stability and long-term tenure of ranch lands comprised of private lands, State lands, BLM, and National Forest leases; the limited acreage of public lands designated for sale or commercial use outside the proposed NCA; low population pressure outside the urbanizing northwestern portion of the valley; the relatively long distance and access to the valley south of I-10 from the Tucson area; its proximity to existing preserves that allow grazing; a high proportion of productive grasslands; good average rainfall; and relatively high grazing capacity.

The natural open space of ranch lands will further enhance the existing preserves that surround the valley, which include Saguaro National Park, Cienega Creek Preserve, Colossal Cave Mountain Park, Posta Quemada Ranch, Empirita Ranch, Coronado National Forest, and the existing Empire-Cienega Resource Conservation Area.

Assuming that the Las Cienegas NCA is approved, it is likely that the potential for sustainable ranching is very high in the Empire-Cienega Valley watershed in comparison to some of the other subareas of Pima County. Other portions of the Empire-Cienega Valley, however, will continue to be susceptible to fragmentation and development as discussed above.

Summary & Conclusions:

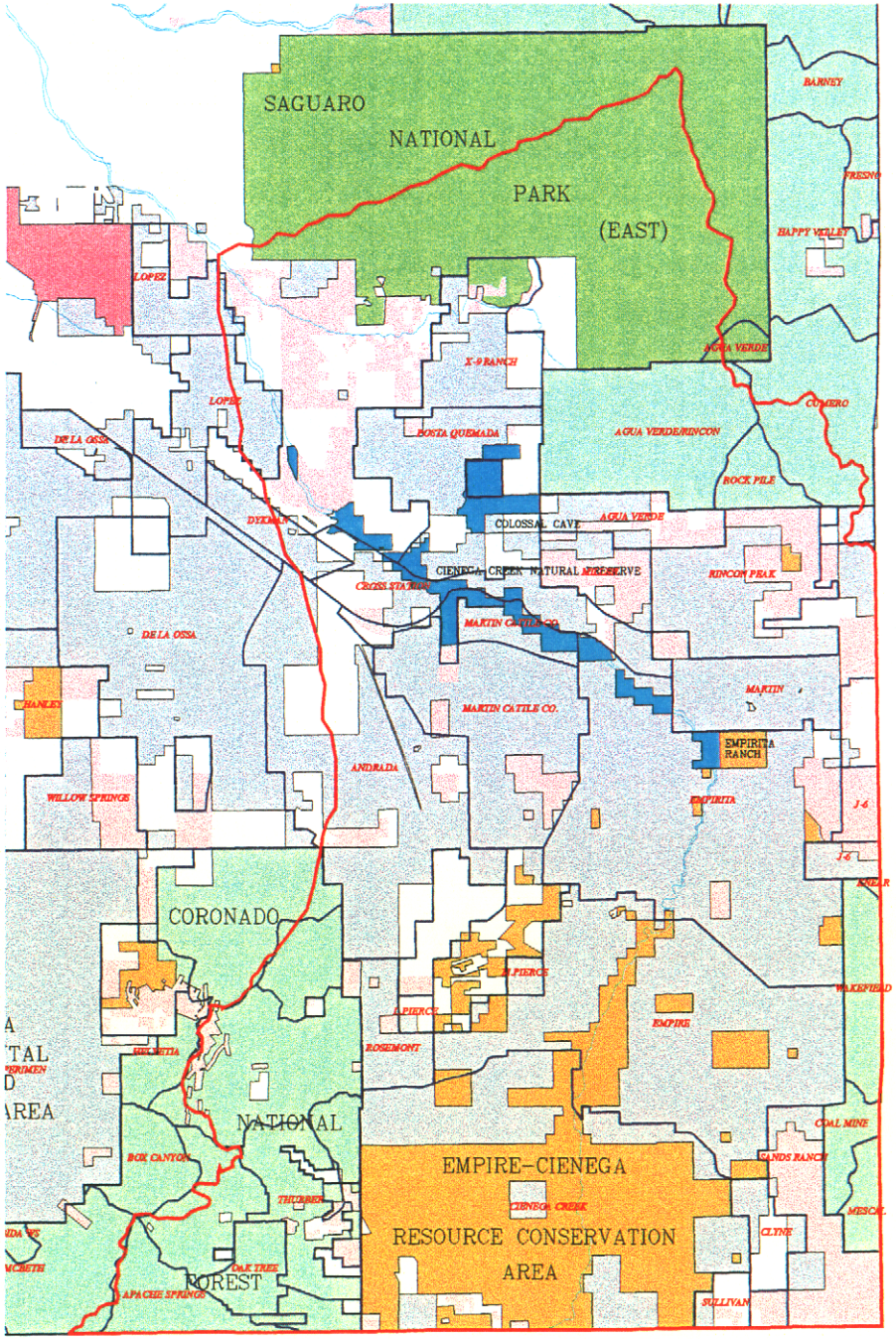
To conclude, the Empire-Cienega Valley watershed continues to support stable and sustainable ranching operations in large part because of its environmental setting and the connectivity of its ranch lands and open space. The valley is located in a rich and varied environment that expresses a range of environmental zones from riparian bottomlands to high elevation evergreen forests, offering the opportunity to use different areas of the valley for grazing as forage becomes available seasonally. The principal vegetation type is scrub grasslands, which comprises some 70 percent of the vegetation in the subarea. Numerous water sources, both natural and constructed, provide water to both cattle and wildlife throughout the watershed in all elevations.

Except for the urbanizing northwest portion and other small subdivisions, the valley remains largely rural, and significantly, some 243,758 acres, approximately 77 percent of the land in the subarea, are used in ranching and agriculture. This includes 31,398 acres, or 48 percent, of all private lands. Some 74,777 acres of public and private lands, or approximately 23 percent, of the valley are not used for ranch purposes. Public lands and preserves available for grazing account for 212,360 acres or 67 percent of the valley.

At the present time there is limited threat from development pressure in the middle and southern portions of the valley; however, urbanization characterizes the northwestern portion of the valley. Population is currently very low at 3,312 people, although it is expected to grow significantly in the northwest with the development of Rocking K Ranch and Vail Valley Ranch. The Empire-Cienega Valley watershed currently has a high potential to continue sustainable ranching due in large measure to the proposed establishment of the Las Cienegas National Conservation Area.

Ranch Lands and Grazing Allotments

SDCP PLANNING UNIT 2

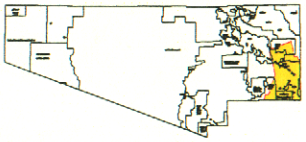


STATISTICS FOR PLANNING UNIT 2

BLM	36,741 AC
COUNTY PARK	5,910 AC
NATIONAL FOREST LANDS	53,715 AC
NATIONAL PARKS AND MONUMENTS	30,866 AC
STATE LANDS	125,584 AC
PRIVATE LANDS RANCH USE	31,397 AC
PRIVATE LANDS NON-RANCH USE	34,305 AC

Planning Unit Boundary
Grazing Allotments
Major Washes
BLM
County Park
Tribal Nations
Military Reservations
National Forest Lands
National Parks and Monuments
National Wildlife Refuge
Private Lands
State Lands
State Park
Ranch Use

Pima County Index Map



Index Map Scale 1:1,500,000

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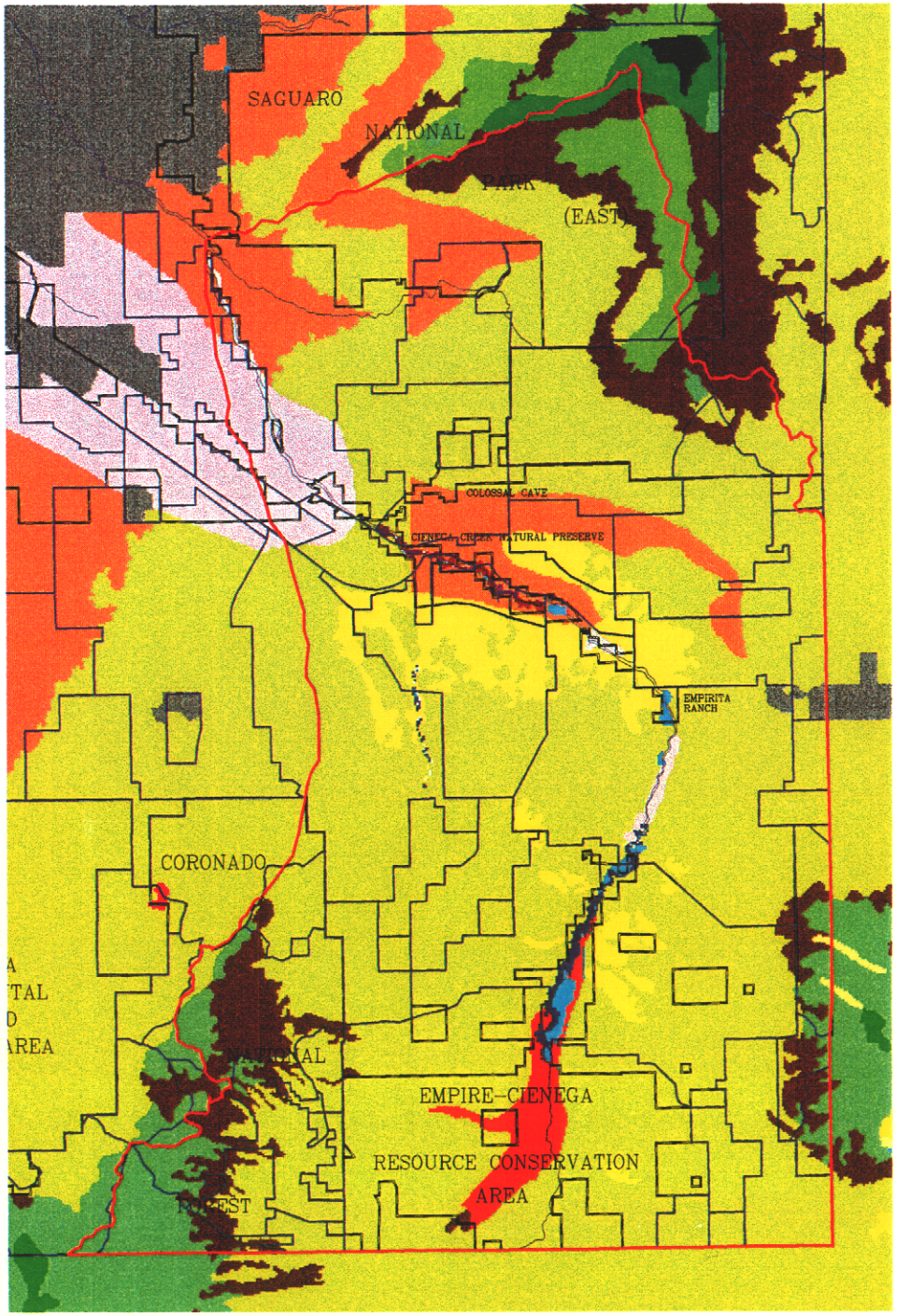
THE SEAL OF PIMA COUNTY ARIZONA

/pysmyowlz/sonora/cultural/asnjoinad/plan2/gmis/ranch_allot2.aml 4/11/00

GAP Vegetation and Grazing Allotments

SDCP PLANNING UNIT 2



Minimum Elevation 2,849
Maximum Elevation 8,597

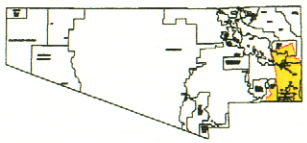
****

VEGETATION ACREAGE

ACRES	BIOME (SERIES)
1,042	Agriculture
13,216	Chihuahuan Desertscrub (Creosotebush--Tarbush)
4,330	Chihuahuan Desertscrub (Mixed Scrub)
23,995	Madrean Evergreen Forest (Encinal)
9,184	Madrean Evergreen Forest (Oak--Pine)
912	Madrean Montane Conifer Forest (Pine)
5,626	Mogollon Chaparral Scrubland (Manzanita)
1,172	Mogollon Deciduous Swampforest (Cottonwood--Willow)
131	Mogollon Deciduous Swampforest (Mixed Broadleaf)
218,002	Scrub Grassland (Mixed Grass--Scrub)
4,875	Scrub Grassland (Sacaton--Scrub)
279	Sonoran Deciduous Swamp and Riparian Scrub (Mixed Scrub)
8,750	Sonoran Desertscrub (Creosotebush--Bursage)
25,431	Sonoran Desertscrub (Paloverde--Mixed Cacti)
413	Sonoran Riparian and Oasis Forest (Cottonwood--Willow)
693	Urban
485	Water

- Watershed Planning Unit Boundary
- Grazing Allotments
- Administrative Boundaries
- Washes
- Agriculture
- Urban
- Mining
- Chihuahuan Desertscrub (Creosotebush--Tarbush)
- Chihuahuan Desertscrub (Mixed Scrub)
- Chihuahuan Desertscrub (Whitethorn)
- Madrean Evergreen Forest (Encinal)
- Madrean Evergreen Forest (Oak--Pine)
- Madrean Montane Conifer Forest (Douglas-Fir--Mixed Conifer)
- Madrean Montane Conifer Forest (Pine)
- Mogollon Chaparral Scrubland (Manzanita)
- Mogollon Chaparral Scrubland (Mixed Evergreen Sclerophyll)
- Mogollon Deciduous Swampforest (Cottonwood--Willow)
- Mogollon Deciduous Swampforest (Mixed Broadleaf)
- Playa
- Scrub Grassland (Mixed Grass--Scrub)
- Scrub Grassland (Sacaton--Scrub)
- Sonoran Deciduous Swamp and Riparian Scrub (Mixed Scrub)
- Sonoran Desertscrub (Creosotebush--Bursage)
- Sonoran Desertscrub (Paloverde--Mixed Cacti)
- Sonoran Desertscrub (Saltbush)
- Sonoran Interior Marshland (Cattail)
- Sonoran Riparian and Oasis Forest (Cottonwood--Willow)
- Unclassified/Mixed
- Water

Pima County Index Map



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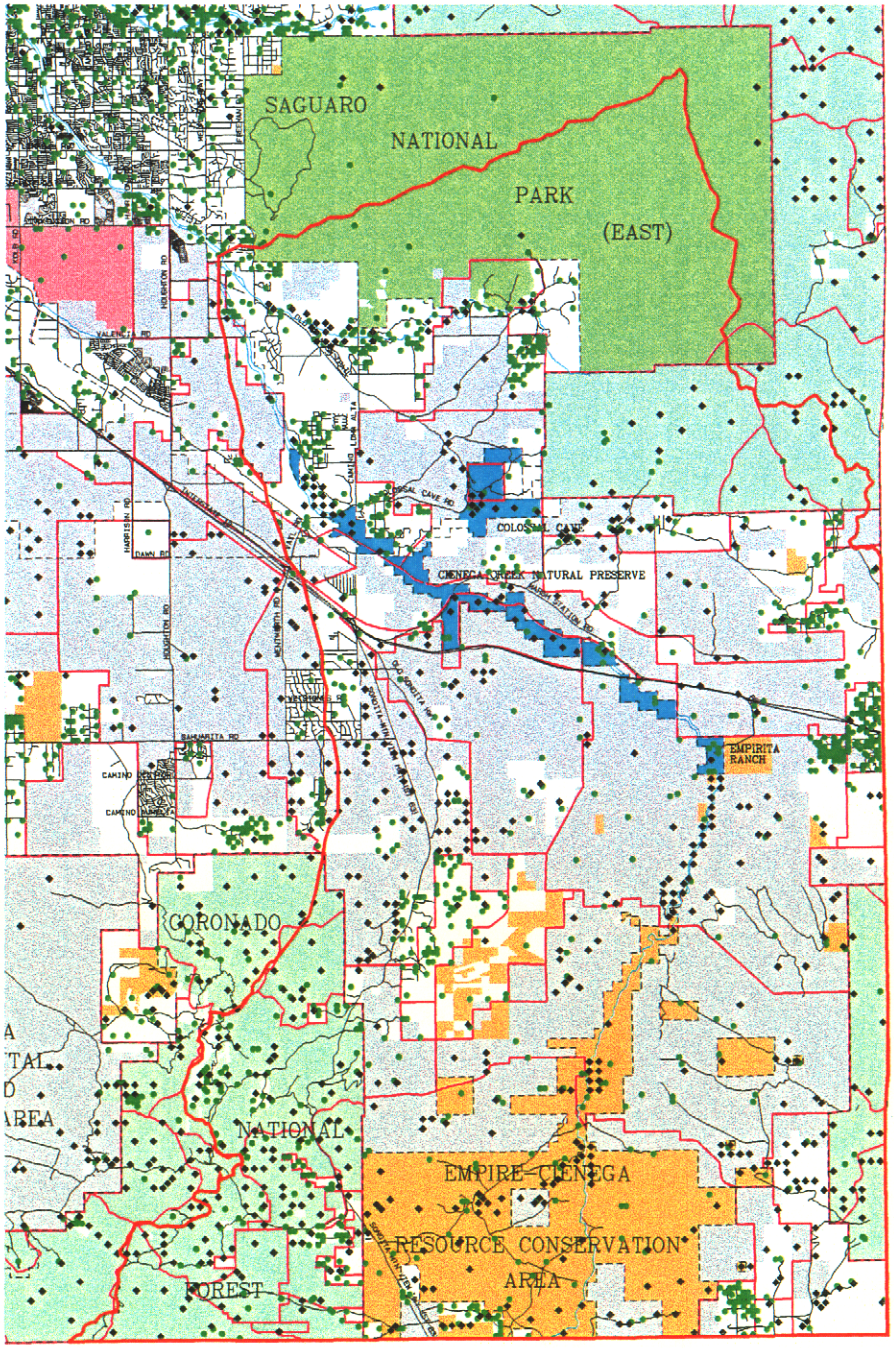
/pygmyowl2/sonora/cultural/asmjoined/plan2/covers/ranch_gap2.aml 4/11/00



Stock Tanks and Well Sites

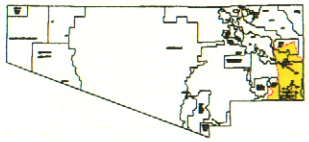
SDCP PLANNING UNIT 2

- BLM
- County Park
- Tribal Nations
- Military Reservations
- National Forest Lands
- National Parks and Monuments
- National Wildlife Refuge
- Private Lands
- State Lands
- State Park
- Roads
- Administrative Boundaries
- Major Washes
- Grazing Allotments
- Watershed Planning Unit
- Stock Tanks
- Well Sites

STATISTICS FOR UNIT 2

Well Sites: 1,196
Stock Tanks: 587

Pima County Index Map



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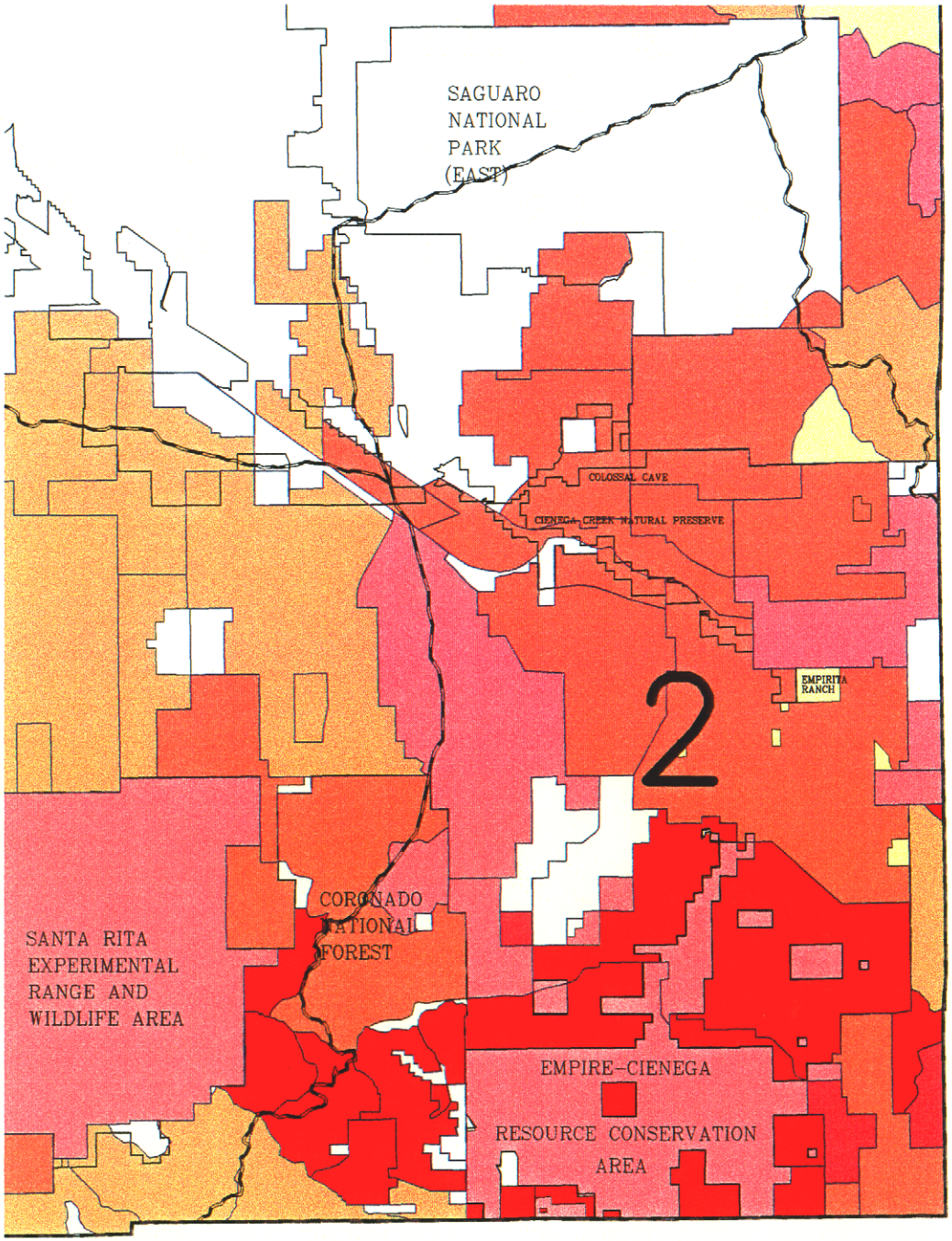
/pygmyowl2/sonora/cultural/esmjoined/plan2/smls/ranch_tank2.eml 4/11//00

Carrying Capacity per Square Mile by Grazing Allotment

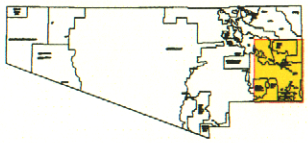


SDCP PLANNING UNIT 2
Cienega-Rincon

- 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

Pima County Index Map



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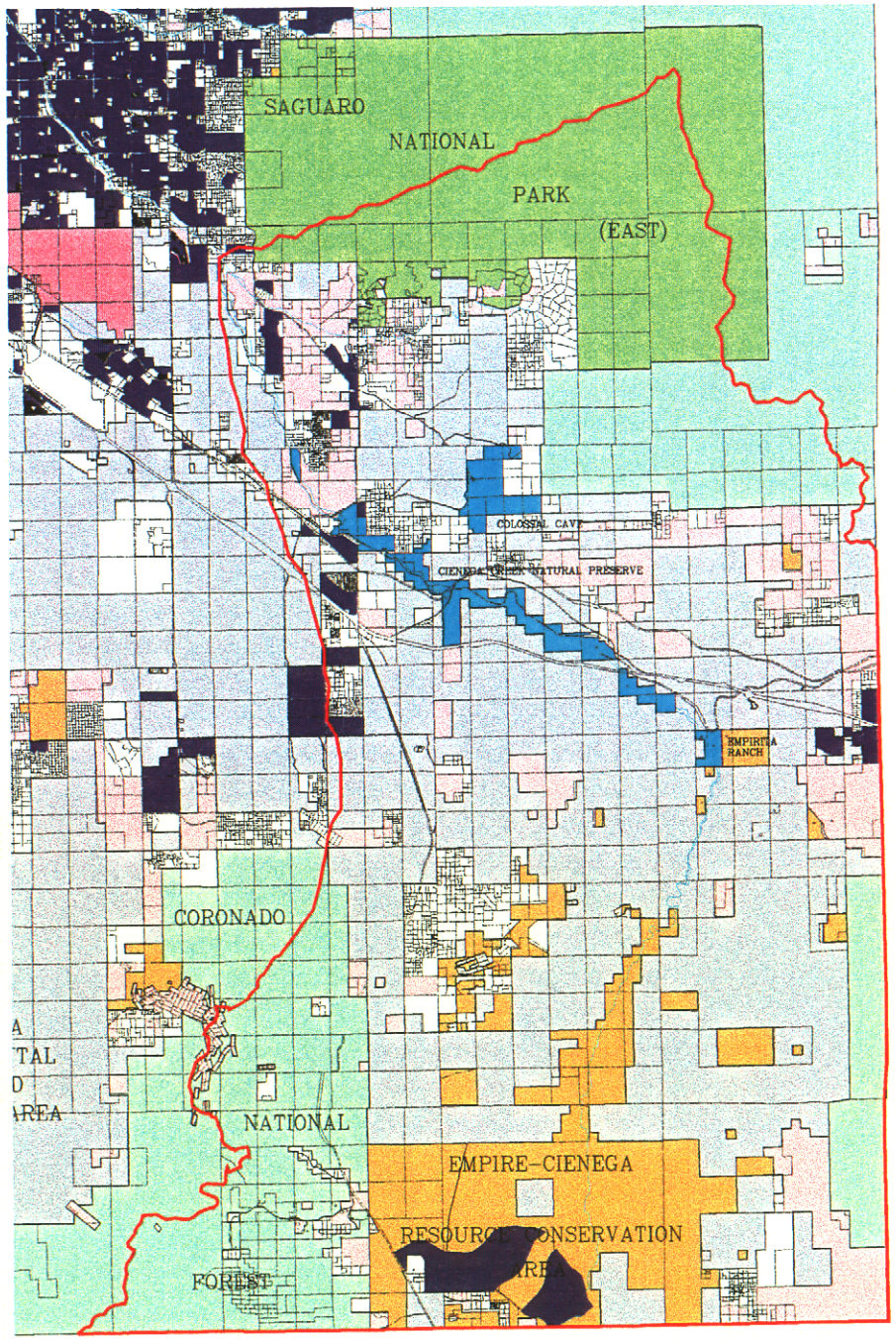
/pygmyowl2/sonora/ranch/covers/rincon_carry.aml Plotted: 3/22/00



Platted Subdivisions

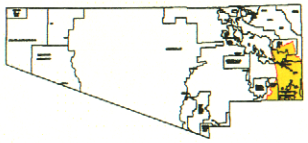
SDCP PLANNING UNIT 2

- Planning Unit Boundary
- Major Washes
- Parcel Lines
- Platted Subdivisions
- BLM
- County Park
- Tribal Nations
- Military Reservations
- National Forest Lands
- National Parks And Monuments
- National Wildlife Refuge
- Private Lands
- State Lands
- State Park
- Ranch Use

STATISTICS FOR UNIT 2

NUMBER OF PLATTED SUBDIVISIONS: 41
ACRES OF PLATTED SUBDIVISIONS: 7,209
NUMBER OF PARCELS: 5,704

Pima County Index Map



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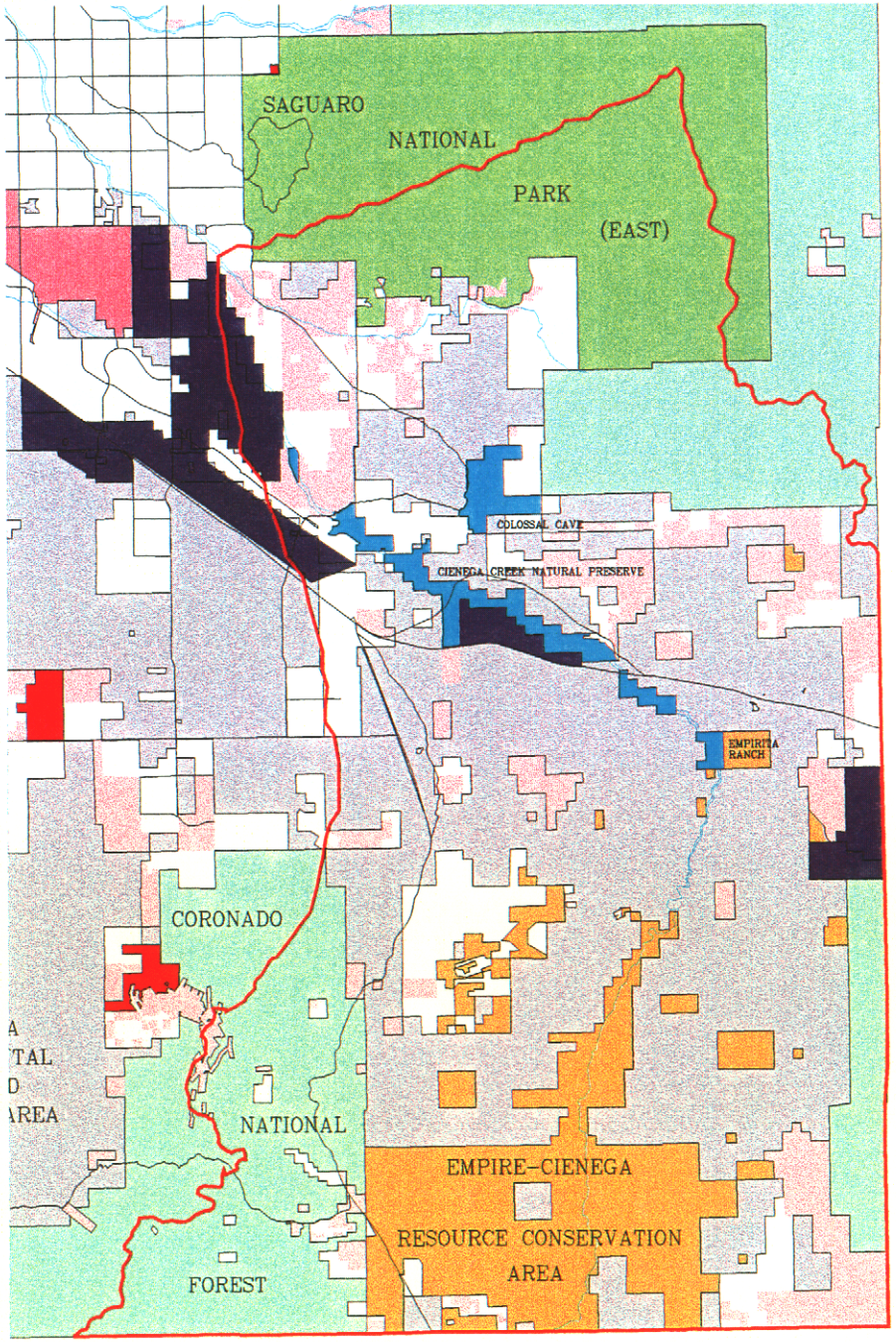
/pygmyowl2/sonora/cultural/esmjoined/plan2/emls/ranch_sub2.aml 4/11/00

Disposable Lands for BLM and State of Arizona



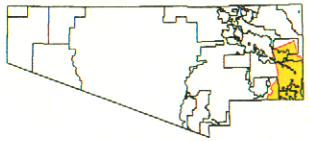
SDCP PLANNING UNIT 2

- Planning Unit Boundary
- Major Washes
- Major Streets
- Disposable Blm Land
- Disposable State Land
- BLM
- County Park
- Tribal Nations
- Military Reservations
- National Forest Lands
- National Parks and Monuments
- National Wildlife Refuge
- Private Lands
- State Lands
- State Park
- Ranch Use

STATISTICS FOR UNIT 2

DISPOSABLE BLM LAND: 0 AC.
DISPOSABLE STATE LAND: 7,857 AC.

Pima County Index Map



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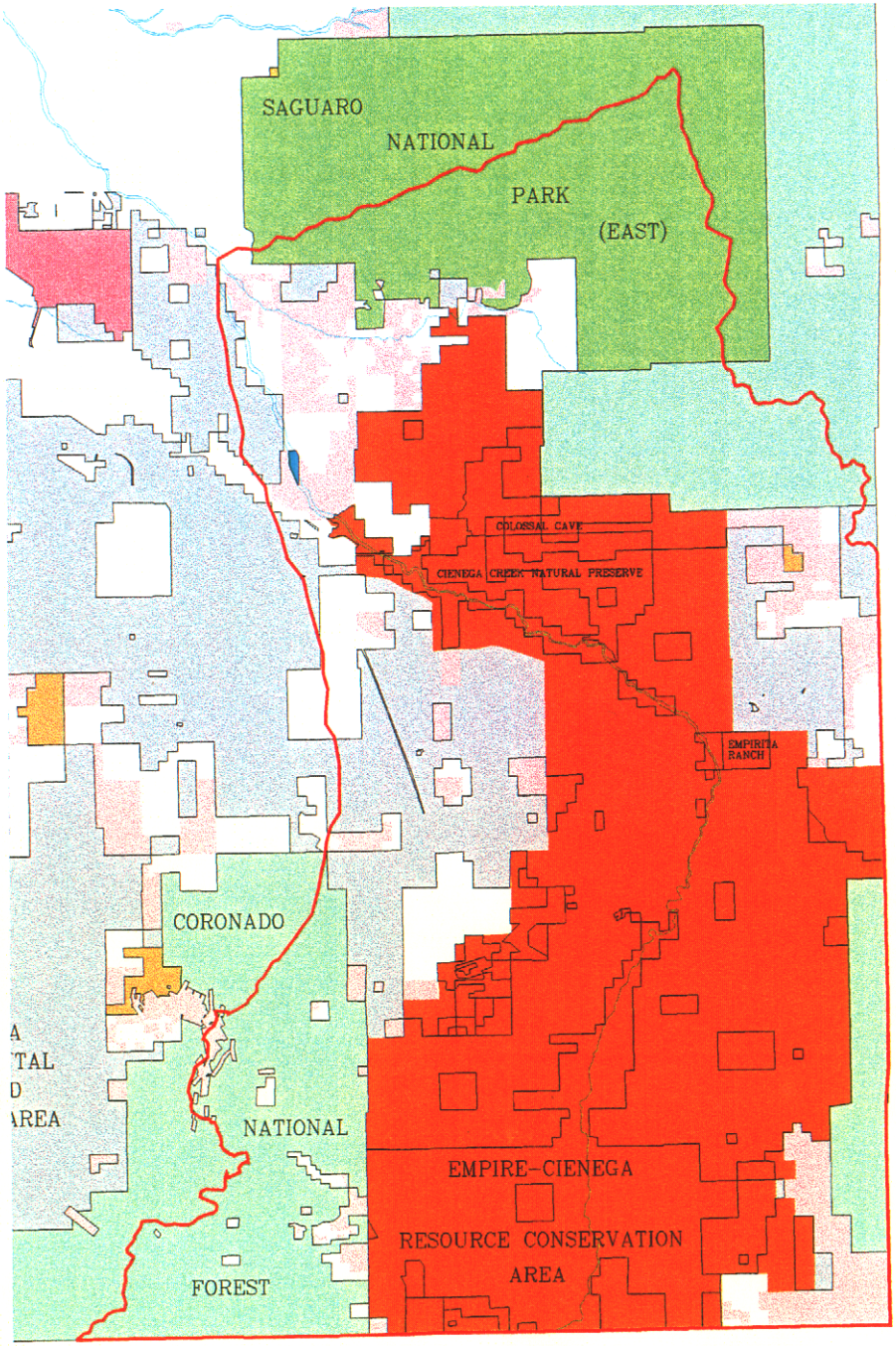
pygmycowl2/sonora/cultural/asajoined/plan2/amls/ranch_disp2.aml 4/11/00



BLM Long Term Management Lands

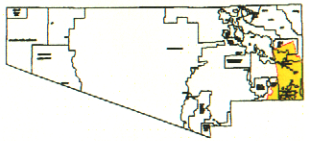
SDCP PLANNING UNIT 2

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

STATISTICS FOR UNIT 2

ACRES OF BLM LONG TERM MANAGEMENT 147,001

Pima County Index Map



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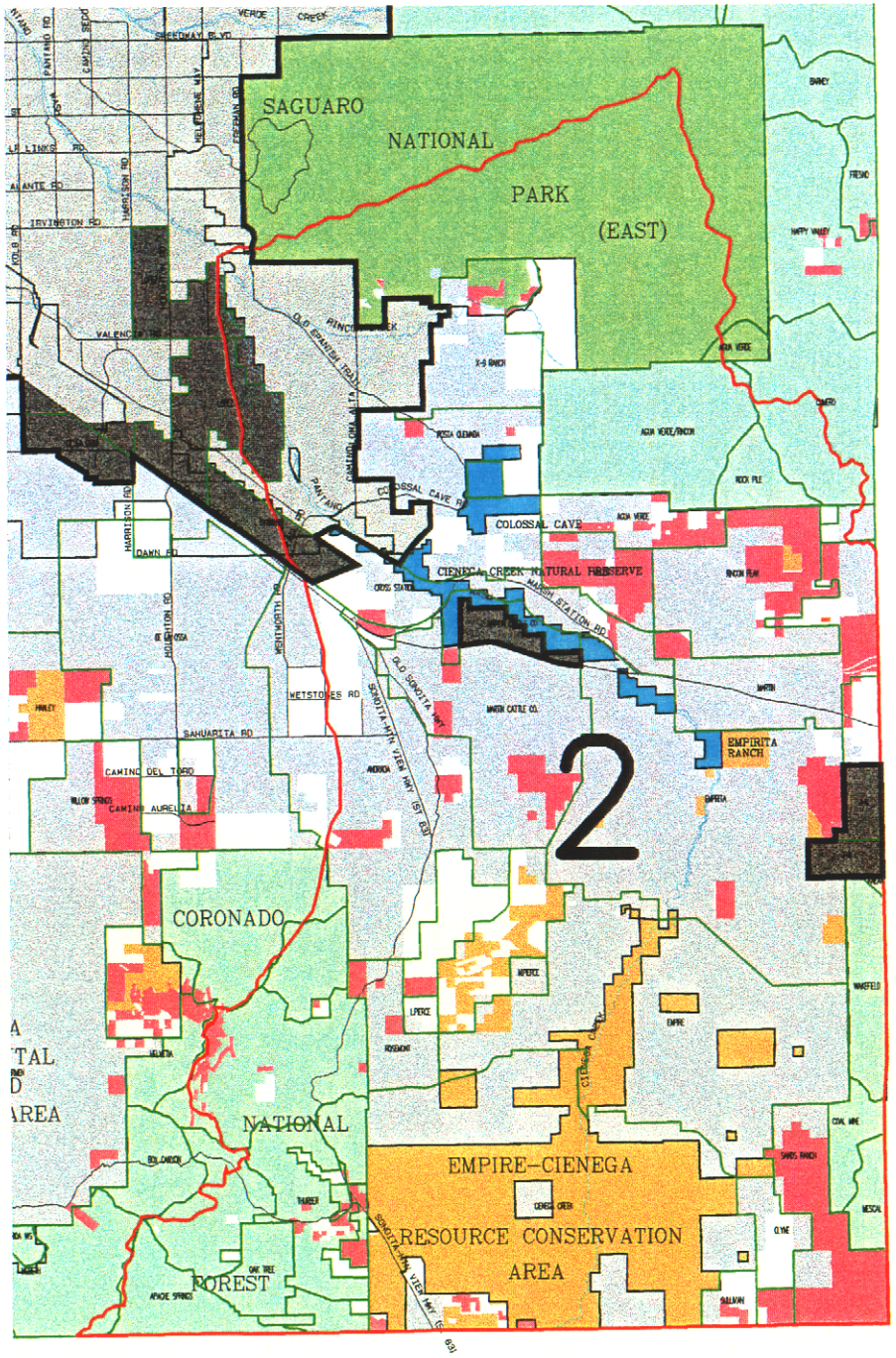
/pydnyowl2/sonora/cultural/esmjoined/plan2/emls/ranch_acec2.aml 4/11/00

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



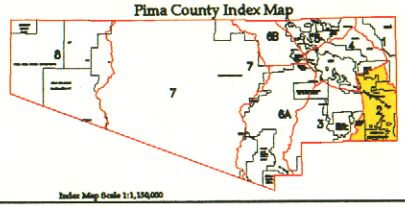
SDCP PLANNING UNIT 2

- 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 LANDS
- STATE PARK
- RANCH USE
- AGRICULTURAL USE
- Urban Boundary
- ASLD / SLUP's

STATISTICS FOR UNIT 2

ACRES OF ASLD/SLUP's 7,817

Pima County Index Map



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/pysmyowl2/sonora/cultural/samjoined/plan2/amls/urban_bnd2.aml 4/11/00

IV-3. Ranching in the Upper Santa Cruz Valley

Introduction:

The Upper Santa Cruz Valley was historically one of the most significant ranching valleys in eastern Pima County. At the heart of the valley is the Santa Cruz River, once a reliable if not perennial source of water along certain reaches. The river and its floodplain was a focus of prehistoric Native American settlement and agriculture, the historic corridor of Spanish Colonial exploration and mission settlement, and the location of Spanish and Mexican period land grants, which established some of the first ranches in southern Arizona. El Camino Real was also the principal route of travel, and linked Colonial New Spain with Tucson, the military and mission settlement at the northern frontier of the Spanish colonial empire.

Today, the Upper Santa Cruz Valley remains an important route of travel, linking Mexico with the United States along Interstate-19. Much of this valley remains largely rural, and is characterized by significant unfragmented expanses of natural open space, comprised principally of ranch lands and a limited amount of public preserves. However, because of Interstate-19 and the developing private lands along the Santa Cruz River floodplain, the river corridor along this historic route of travel is rapidly urbanizing, especially in the areas of Green Valley and Sahuarita. With the exception of that portion of the river that flows through the San Xavier District of the Tohono O'odham Nation and the possibility of an open space preserve in the Canoa Ranch and Amado areas, the conversion of rural, agricultural private lands along the Interstate-19 transportation corridor to development and commercial use is likely to continue, resulting in "strip urbanization" within the Upper Santa Cruz Valley.

At the present time, the future of the Canoa Ranch comprised of 6400 acres along the Santa Cruz River is not resolved. Proposed for development and the expansion of the Green Valley retirement community by Fairfield Homes, debate continues about how to preserve its natural and cultural values. Once one of the most significant working ranches in southern Arizona, this ongoing debate over the conservation of Canoa Ranch reflects the greater community's concerns about how to control urban sprawl, maintain open space, conserve water, allow public recreation, and protect cultural and natural resources, while acknowledging that growth in the region is ongoing.

As a consequence of the largely undeveloped nature of the valley and the development trends along the Interstate-19 corridor, ranching continues in the Upper Santa Cruz Valley, but is discontiguous from east to west and is spatially separated by the urbanization of the Interstate-19 corridor. Environmentally, ranching tends to be located in the upland areas on the slopes and bajadas of the surrounding mountain ranges and located away from the rapidly developing riparian corridor of the Santa Cruz River.

Historical Summary of the Upper Santa Cruz Valley:

The initial occupation of the valley by the prehistoric Archaic peoples dates perhaps as early as 5,000 B.C., and while there are no Paleoindian occupation sites that have been identified, Paleoindian use of the valley perhaps as early as 10,000 B.C. is certainly possible. Previous archaeological investigations indicate that people have occupied southern Arizona for at least 11,000 years. Three major prehistoric archaeological time periods, Paleoindian, Archaic, and

Hohokam are recognized in the Upper Santa Cruz region. Prehistoric sites were predominantly Hohokam sites (ca. A.D. 700-1450), but some sites dating to the earlier Archaic Period (ca. 5000-1000 B.C.) are also present.

Late Archaic sites have recently been found to represent a considerable occupation in the Tucson Basin in areas along the Santa Cruz River with reliable water. Given the water reliability at Canoa, it is possible that similar occupations may be present at the Canoa site. In addition to large village complexes along the upper floodplain, seasonal habitation and limited activity sites associated with plant procurement and processing are also likely to be present. Houses would take the form of shallow, round pit houses, and the artifact assemblage would be comprised largely of stone tools and ground stone, with no pottery vessels. Increasing reliance on agriculture and the beginnings of ceramic technology mark the transition to what archaeologists have termed the Hohokam sequence of occupation.

The Hohokam were a sedentary agricultural society who constructed houses built in shallow pits and later as above ground pueblo-like structures of rock and adobe. They produced both plain and decorated pottery and other crafts using shell, stone and clay. Villages tended to be organized into clusters of pit houses probably representing extended family groups, and public architecture in the form of ballcourts which gave way to later platform mounds were typical. Agricultural intensification is evidenced by use of the irrigable floodplain, as well as use of upland areas where dry farming and cultivation of agave became increasingly common. By the late Classic period, many of the villages were abandoned and populations aggregated into a smaller number of large integrated pueblo communities typically enclosed by a compound wall. While the causes of the decline of the Hohokam are not fully defined, some stresses may have been environmental, limits to food production, increased population pressure, conflict from changes in political and trade alliances, and perhaps social and religious factors. Whatever the suite of factors, by the end of the Classic period, the great cultural traditions of the Southwest, the Hohokam, Anasazi, and Mogollon, ended, and populations dispersed, marking the end of the Classic Period by about A.D. 1450.

Following the demise of the Hohokam tradition and the abandonment of the large villages, the ensuing period is not well-documented or well-understood. Social and economic changes are significant, with evidence for much lower organizational and socio-political complexity. The archaeological record is sparse and fragile suggesting mobility and small group size. By the time the Spanish arrive in the 1690s, these people are identified linguistically as northern Pimans. Settlement was dispersed into small groups living along river courses in simple brush structures pursuing an agricultural economy supplemented by hunting and gathering. Despite these considerable changes, the Pima and Tohono O'odham consider the Hohokam their ancestors, as do some of the Hopi clans.

The very first Spanish entradas to venture into southern Arizona in the 1690s were relatively late in comparison to earlier explorations elsewhere in the Southwest. Father Kino's arrival in southern Arizona was indeed a landmark event that brought significant changes in social and economic life as well as religious beliefs. In 1691, Kino first traveled from Sonora north along the Santa Cruz River to the Piman villages of Tumacacori and Guevavi and the Tucson area settlements at Bac and "stjuckshon," later known as Tucson. The very first mission was established at Guevavi and its "visita" at Tumacacori. The northernmost mission, San Xavier del Bac was established by Kino in 1700 to serve the Tucson area. The route connecting these missions in the Santa Cruz River valley between Sonora and Tucson were protected by presidio garrisons as along other Caminos Reales elsewhere in New Spain.

With growing unrest among the Piman mission communities and increased pressure from Apache raiding, the Spanish military assumed increasing power over the communities almost exclusively served by the Missionaries. Following the Piman Revolt of 1751, a military presidio or garrison was established at Tubac in 1753. Efforts to "reduce" or concentrate the native Pimans into larger aggregate communities were increased. This concentration unfortunately created rich raiding opportunities for Apaches who repeatedly attacked these settlements. By the 1770s, Apache raiding was so devastating on the San Pedro River that the presidio of Terrenate was transferred. It lasted only four years before being transferred again. The native Sobaipuri abandoned their villages and joined the Tucson area settlements, leaving the Apaches to refocus their raiding on the Tucson mission villages. As a consequence of Apache raiding on the Tucson villages and to secure some protection for the route to Alta California, the Tubac presidio was relocated to Tucson in 1775, and the Tucson villages were "reduced" to Bac and Tucson. Also at this time, the Juan Bautista de Anza expedition from Sonora to establish the San Francisco, California settlement followed the route of the Camino Real along the west bank of the Santa Cruz River. Journeying north from Tubac, the expedition camped at "La Canoa," which is the first campsite location mentioned in the 1775 Spanish journals, "Llano Grande" near Sahuarita, and at San Xavier, all within the Upper Santa Cruz Valley.

Spanish and Mexican Land Grants & Early Ranches in the Upper Santa Cruz Valley:

With the implementation of a "pacification policy" that provided food and other goods to the Apaches living near the Tucson presidio, there were relatively peaceful conditions beginning in the 1780s, which lasted until Mexican Independence after 1821. During this time, Spain encouraged settlement by civilian farmers and ranchers by making large grants of land to potential settlers, and Mexico followed the same policy. Some 21 petitions for land grants were filed in southern Arizona during this time, including the San Ignacio de la Canoa Land Grant and El Sopori in the Upper Santa Cruz Valley. Together these claims totaled nearly 190,000 acres or about 300 square miles. While the Canoa land grant would be later upheld in US courts, the Sopori land grant was denied. Today these original land grants represent the very earliest attempts to establish cattle ranching by civilians in the Santa Cruz Valley outside of the mission settlements.

San Ignacio de la Canoa - In 1820, two brothers, Tomas and Ignacio Ortiz applied to the Spanish government for a land grant of four "sitios," or 17,000 acres, (1 sitio = 1 square league or 4,338.5 acres) along both sides of the Santa Cruz River and the Camino Real, beginning five leagues (1 league = 13,747 ft or 2.6 miles) north of Tubac at La Canoa and extending north to El Saguarito, today known as Sahuarita.

The Ortiz brothers received this grant at the transition to Mexican independence in 1821 and began cattle ranching later in the 1820s. However, increasing hostilities from Apaches drove the Ortiz families from the ranch in the 1830s, although they continued to raise cattle and retained title to the land. Rosa Ortiz later testified in the Ortiz land claim hearing that Indians burned their ranch house when she was a little girl and the family moved to Tubac. Some years later, Apaches also burned their Tubac house, and their land grant title papers were destroyed as well. Title was restored in 1849 by the Mexican government.

Following the Gadsden Purchase in 1854, which brought the Canoa Ranch into the United States, a group of 18 squatters from Maine under the leadership of a man named Edwin

Tarbox established a lumber camp, hotel, and residences at La Canoa known as the Cross Road Tavern. This settlement of lumbermen at Canoa operated successfully for several years until it, too, was destroyed in an Apache attack in 1861 known as the Tarbox Massacre. All settlers were killed and the hotel and houses were burned to the ground. By the beginning of the American Civil War, the Santa Cruz Valley became the scene of intense warfare with the Apache, which lasted some 25 years.

Despite this ongoing threat, Tucson businessmen Frederick Maish and Thomas Driscoll purchased the Canoa Land Grant in 1876 from Tomas Ortiz and the heirs of Ignacio Ortiz who was killed by O'odham Indians in 1857. They petitioned the US government for recognition of the grant in 1879 and confirmed title in 1880. In 1899, the Government Land Office surveyed the boundaries of the Canoa Land Grant, setting stones at half-mile intervals and centered on the Santa Cruz River, which resulted in today's legal boundaries.

Maish and Driscoll continued the cattle ranching operation throughout their tenure, leasing the property for a brief period from 1910-1912, when the Canoa Land Grant was sold to Levi H. Manning in 1912, for $165,000. He proceeded to expand and develop the ranch into what is reported to have been one of the finest cattle ranches in the southwest. In 1916, Manning sold the northern half of the land to the Intercontinental Rubber Company for a wartime experiment in the raising of guayule as a substitute for rubber. However, the economics of synthetic rubber precluded its becoming a success, and the project was abandoned, leaving the settlement of Continental as testimony to this experiment.

Meanwhile, Manning continued to expand the Canoa Ranch and acquired adjacent lands increasing the acreage of the Canoa Ranch to over 100,000 acres. In 1921, Manning's son Howell Sr. took over actual operation of the ranch, and by 1925 the Canoa Ranch had been developed into a hacienda complex of Sonoran-style adobe buildings housing the Manning family and as many as 35-40 cowboys and their families. A school was built for their children, and the Canoa Ranch, at its peak between 1912 to 1951, operated as a small village and became the social and economic hub of the middle Santa Cruz valley.

With the death of Howell Manning's son, Howell Jr. in 1951, Howell Sr. decided to consolidate his assets, and the Canoa ranch began to be sold off. In 1953, 128,000 acres of deeded and leased lands were sold to Kemper Marley of Phoenix, which now comprises the Marley Ranch holdings. The land was sold for about $600,000 and took almost all of the Manning's holdings except for the southern half of the original Canoa Land Grant. In 1967, the Madera Land and Cattle Company purchased 2600 acres of the Canoa Ranch. Howell Manning Jr. is survived today by his wife, Louise "Deezie" Manning-Catron and two daughters, Anne and Leslie.

Since the sale of the ranch holdings, ownership of the southern half of the original Canoa land grant has changed numerous times, until the most recent purchase of 6400 acres by Fairfield Homes for about $6.4 million or $1000 per acre.

The northern half of the original Canoa Land Grant now comprises the Green Valley community, pecan orchards owned by Farmers Investment Company (FICO), and other private holdings. Today, the town of Sahuarita, once known as "El Saguarito" a landmark along the Camino Real, is located to the north of the former Canoa Ranch.

El Sopori Land Grant - The name Sopori is either a corruption of Sobaipuri, the name of the Pima Indian group encountered by Fr. Kino in the 1690s, or from the Spanish word, *sopor*, meaning peaceful or drowsy. Like Canoa, Sopori also was a place with reliable water where a spring, *Ojo del Agua de Sopori*, was used to irrigate the Sopori valley. Also like Canoa, this was a place of long-term human settlement and an historic Pima village or rancheria, which had been occupied for many years prior to the Piman Revolt of 1751. Abandoned after the revolt and as a consequence of the Spanish policy to aggregate native peoples into mission communities, the Sopori rancheria became one of several ranches and a rich mine owned by Captain Juan Bautista de Anza when he was commander of the Tubac Presidio from 1760-75. With his departure and Mexican Independence in 1821, Sopori was again abandoned and depopulated.

Despite Apache raiding of outlying ranches, a wealthy Sonoran, Joaquin Astiazaran petitioned the Mexican government in 1838 for a grant of 31 and 7/8ths sitios in the "wastelands of Sopori," stretching from Tubac to San Xavier. He apparently never occupied the land, but his heirs were able to sell their rights of the unconfirmed land grant to American interests following the Gadsden Purchase of 1854. These interests, the Arizona Land and Mining Company and the Sopori Land and Mining Company, each purchased portions of the Mexican claims as well as the interests of American squatters who had occupied the land. During the late 1850s, pioneers such as Charles Poston and Frederick Ronstadt developed Sopori as a cattle ranch, cultivated the land, and worked a gold mine. In 1861, it is reported that several hundred Apaches swept through the Santa Cruz Valley and Sopori Ranch, killing the foreman driving off the livestock, and forcing the company to close down operations.

In 1866, the Sopori Land and Mining Company purchased all rights to the land and began the long struggle to confirm their title. There were conflicting claims from the Elias family who continued to live on the ranch, and the Penningtons had also lived on the ranch. In 1881, this confirmation was recommended for denial by Surveyor General John Wasson, "on the grounds that the original title papers are forged, ante-dated, and otherwise invalid." This recommendation was forwarded to Congress by the Secretary of the Interior, and the land claim of 142,000 acres was rejected by the Court of Private Land Claims in 1895. The US Supreme Court refused to hear an appeal. Following this rejection, there are records transferring some Sopori lands to the Elias family and the Sopori Land and Cattle Company beginning in 1902.

Later owned by James Converse, who also ran the Tanque Verde Guest Ranch, the Sopori Ranch changed ownership several times. Eventually, the Sopori Ranch Company eventually sold the entire ranch in 1950 to Ann Boyer Warner, widow of Jack Warner of Warner Bros. movie studio fame. Following the death of Ann Warner in 1991, the ranch which then encompassed some 59,000 acres was purchased by John Croll, an investor from Illinois, to settle the estate. Croll renamed Sopori Ranch the "Inscription Canyon Ranch," after a successful development project he directed in the Verde Valley.

While Sopori Ranch remains one of the largest working ranches in Pima and Santa Cruz counties, it was clearly purchased as an investment property for development. Now with the recent death of John Croll, the heirs continue to operate the Sopori as a working cattle ranch; however, the future of the historic Sopori Ranch remains uncertain.

Other Early Ranches - During the late 1800s, there were other attempts to begin ranching and lumber operations in the middle Santa Cruz valley despite the Apache threat. Some of these ranches that were at least initially successful include Rhodes Ranch, Moyza Ranch, Reventon Ranch, and Batamote Ranch among others. Farther south, Pete Kitchen established El Potrero, known as the only safe location between Sonora and Tucson, and a began freighting business using the Camino Real, which he named as the "Pete Kitchen Road - Tucson, Tubac, Tumacacori, To Hell." Ranches supplied the growing cattle market in Tucson and the booming nearby mining districts in the foothills of the Sierrita and the Santa Rita mountains.

McGee Ranch - Another important historic ranch that has shaped ranching history in the Upper Santa Cruz Valley is the McGee Ranch founded in 1895 by a group of families en route to seek their fortunes in the mines of California. Today this community of some 110 families (about 350 people) is made up almost entirely of descendants of three frontier families, that of J.R. McGee, George Harris, and David Lively. Having met at the Carlisle Mine in New Mexico in 1882, the McGee and Harris families continued to pursue their livelihood in mining and traveled next to Greaterville east of the Santa Rita Mountains, and later, looked farther west to more lucrative mining claims in California. Near the Sierrita Mountains, their wagon broke down, and while waiting for the wheel to be repaired in Tucson, they began to search for gold. Finding at least some, as well as wild cattle, the families decided to stay. Eventually, the group found an abandoned homestead in the eastern foothills of the Sierrita Mountains, where the McGee Ranch was established and remains to this day.

When Arizona became a state in1912, the land claimed by McGee Ranch was "checker-boarded" into State and BLM parcels. Parcels had to be "reclaimed" through the Homestead Act, and in the 1930s various family members consolidated their holdings and formed a family corporation to hold the land in trust for present and future community members. In 1966, the corporation purchased the Soto Ranch on the west side of the mountains. The McGee Ranch now encompasses some 30 square miles of the Sierrita Mountains, and it includes deeded land owned by the community and leased State and BLM lands. In addition to its adjoining lands in the Sierritas, McGee Ranch also once utilized land on the Canoa Ranch. Leased as early as 1911, portions of Canoa Ranch were leased again by the McGee Ranch community from the 1970s to 1995, when they ended their lease due to drought and gates that were always left open.

Today the McGee Ranch community has developed into a settlement of close-knit families whose members can trace their roots for the last 100 years to the first founding families. Many community members continue to live on the ranch and work for the community, and others work off the ranch. While the original families earned their living through mining and ranching, the McGee Ranch community later diversified their traditional industries to ensure employment and income for their family members. With the purchase of a government surplus bulldozer, they began to take on construction jobs to supplement their income. In 1942, they formed a family corporation, the "Sierrita Mining and Ranching Company," which today specializes in construction jobs in rough terrain in Arizona, New Mexico, and Nevada. This successful enterprise, together with cattle ranching, which remains a mainstay of the ranch community, and some mining, provides employment and income for the entire community.

The Santa Rita Ranch & Experimental Range - Unique to the Upper Santa Cruz Valley is the Santa Rita Experimental Range (SRER), which was founded in 1903, and is the oldest research area founded by the USDA Forest Service. It has been a principal site for pioneer range research on the improvement and management of semi-arid grasslands in the Southwest. Similarly, the Desert Botanical Laboratory some 35 miles north on Tumamoc Hill in Tucson was also founded in 1903 as a research station to monitor the vegetation of the Sonoran Desert while the SRER was established for grasslands research. The Santa Rita Range Reserve was originally contained within the Santa Rita Forest Reserve as established by President Theodore Roosevelt in 1902 and managed by the Department of Interior. These forest reserves were transferred to the Department of Agriculture in 1905 to form the Forest Service. In 1910, the Santa Rita Range Reserve was transferred to the Bureau of Plant Industry with no national forest designation. President Taft set aside nearly 42,000 acres for the SRER, and it was again expanded a number of times, resulting in its present size of 53,159 acres, some 83 square miles.

The SRER remained part of the Forest Service Southwestern Station until 1975. In 1988, the SRER was part of a federal-state land exchange, which provided for an exchange of state trust lands for federal lands comprising the Santa Rita Experimental Range. The SRER was transferred to the Arizona State Land Department from the Forest Service in exchange for various State parcels located in Catalina State Park, Buenos Aires Wildlife Refuge, Arivaca Lake, the Central Arizona Project aqueduct in Pima County, Black Canyon in Yavapai County, and the Madera-Elephant Head trail in Pima County.

As a consequence, the SRER was classified as "trust lands in university grant status," and assigned to the University of Arizona for use for ecological and rangeland research purposes." The 1988 State Act (SB 1249) further notes that, "this use shall continue until such time as the legislature determines that the research use can be terminated on all or part of the lands." While there are no time limitations noted in the legislation for rangeland research, it is possible that the SRER could be sold in the future for development by the Arizona State Land Department. The SRER range is currently used by the University of Arizona for grasslands research in cooperation with a local rancher who holds the current grazing leases.

Since its establishment, the SRER has provided a location for long-term ecological research, and is generally viewed as a world-class facility because of the long-term historical and biological data bases that have been maintained since its creation. In addition to research on semi-desert grasslands, other research has focused on wildlife-livestock interactions, cattle foraging behavior, and small mammal habitat interactions, including extensive research on rodents, insects, quail, javelina, coyotes, and deer. Other research has been focused on range management principles for semi-desert grasslands, especially with regard to grazing systems, seasons of use, production-utilization levels, and general range ecology, so that range managers can use these data to design management plans and grazing strategies suitable for southwestern rangelands.

Today, the Upper Santa Cruz valley continues its ranching tradition and is home to about 25 ranches. While the ranch boundaries have changed over time, these still include lands that once comprised the Canoa and Sopori land grants and the Santa Rita Experimental Range. The valley is comprised of 449,684 acres (702.6 square miles), second only in size to the Altar Valley in eastern Pima County.

Land & Environmental Setting:

Located to the south of the urban Tucson Basin and running parallel to the San Pedro, Empire-Cienega, and Altar valleys, the Santa Cruz River in the Upper Santa Cruz Valley flows north from Santa Cruz County and Mexico and its headwaters in the San Rafael Valley in Santa Cruz County. It continues to flow north into the urban Tucson area and north into Pinal County. Fortunately, erosion and significant flooding events have not caused the Santa Cruz River in its upper reaches to become as deeply channelized as has occurred farther downstream.

Unlike the urbanized Tucson area, the Upper Santa Cruz valley remains largely rural, except for urbanizing areas along the river and Interstate-19 corridor. The valley has an estimated population of 31,030 people. Its principal settlements are Green Valley, Sahuarita, Continental, Corona de Tucson, McGee Ranch, and the Arivaca Junction-Amado area. The San Xavier District of the Tohono O'odham Nation is located at the north end of the valley, and public preserves include the Santa Rita Mountains of the Coronado National Forest and the adjacent Santa Rita Experimental Range on the east side of the valley. There are no public preserves on the west side of the valley. Suburban and urbanizing areas characterize the Santa Cruz Valley along the river and the Interstate-19 corridor especially in the Green Valley area of the former Canoa land grant. Significant copper mining operations by ASARCO located to the west of the Santa Cruz River and Green Valley have had a significant impact on the landscape and represent almost twice as much land area as the urbanized portions of the valley.

The Upper Santa Cruz Valley is bounded by the Santa Rita Mountains and Coronado National Forest on the east, the San Xavier District of the Tohono O'odham Nation to the north, the Sierrita and Cerro Colorado mountains to the west, and the Santa Cruz County line to the south. The Upper Santa Cruz Valley watershed reflects a significant range in elevation from 2454 to about 8000 feet in Pima County. Just to the south in Santa Cruz County, Mt. Wrightson at 9453 feet is the highest point of the Santa Rita Mountains.

Because of the range in elevation, rainfall, too, is highly variable ranging from about 11 inches annually at the lowest elevations to an estimated 31 inches at the highest elevations. Most of the rainfall in this watershed is estimated to average about 13 - 23 inches annually. This amount of rainfall covers nearly 96 percent of the subarea acreage.

Table IV-3.1 Major Vegetation Zones in the Upper Santa Cruz Valley Watershed

▸	Agriculture/Pasture	13,182 acres	2.9 percent
▸	Urban	15,860	3.5
▸	Mining	28,872	6.4
▸	Paloverde-cacti	75,914	16.9
▸	Water surface	138	0.0
▸	Creosote-Bursage	21,205	4.7
▸	Deciduous/Riparian	1,315	0.0
▸	Scrub Grassland	281,601	63.0
▸	Conifer Forest	211	0.0
▸	Evergreen Forest	11,386	2.5
	TOTAL	449,684 acres	99.9 percent

As with much of the Basin and Range province of the greater Southwest, the rugged mountain terrain and river valley support a variety of environmental zones and vegetation types, ranging from the Santa Cruz River floodplain to higher elevation evergreen forests of the Santa Rita and Sierrita mountain ranges that surround the valley. Much of the valley is characterized by a broad, gently sloping bajada that accommodates broad expanses of grasslands that extend into the foothills of the surrounding mountain ranges.

Water is available from a number of springs found mostly in the Santa Rita Mountains on the east side of the valley and in the Sierrita Mountains to the west. Surface water covering only some 138 acres is found in the valley, but none is noted in the Santa Cruz River itself due to downcutting of the river channel and overdrafting of the aquifer for agricultural, mining, and other uses.

It is somewhat ironic that the historic course of the Santa Cruz River whose waters once fostered prehistoric and historic Native American, Spanish, Mexican, and Anglo settlement, is now a much degraded, dry channel stripped of its cottonwoods, willows and cienegas. Not surprisingly, no areas of shallow ground water have been identified in the Santa Cruz River floodplain. Only 1551 acres along Sopori Creek are classified as having areas of shallow groundwater. Numerous stock tanks and wells today supplement any remaining natural water sources for cattle and wildlife use. Domestic wells account for approximately 1100 wells that are recorded with the Arizona Department of Water Resources.

Table IV-3.2 Natural & Constructed Water Sources in the Upper Santa Cruz Watershed

Springs	Intermit Major Streams	Surf. Water	Stock Tanks	Shallow Grnd-Water	Wells
24	ca. 30 mi.	138 ac	527	1551 acres	1931

As a consequence of its natural environmental setting that includes an abundance of grassland totaling about 63 percent of the major vegetation type in the valley, numerous natural and created water sources, and a range of environmental zones, which can be seasonally grazed, ranching in the Upper Santa Cruz Valley watershed continues to be a significant and sustainable land use.

Land Base & Land Uses:

Nearly all of the Upper Santa Cruz Valley subarea is located in unincorporated Pima County, except for the southern boundary of the City of Tucson to the south of the Interstate-10 corridor and the incorporated town of Sahuarita, which extends for 9206 acres along the Interstate 19 corridor from the southern boundary of the San Xavier District to just north of Green Valley.

The balance of the watershed, like much of Pima County, is comprised of a mosaic of land ownership including federal, state, and private lands, and a significant portion of this land is publicly owned. Approximate acreages are provided below for each kind of ownership.

Table IV-3.3 Land Ownership & Jurisdictions in the Upper Santa Cruz Valley

National Forest	41,034 acres	9.1 percent
BLM	7,724	1.7
Indian Lands	31,612	7.0
State Lands	212,745	47.3
Private Lands	156,455	34.8
Unknown	114	0.0
TOTAL	449,684 acres	99.9 percent

Green Valley, Sahuarita, Continental, Arivaca Junction-Amado, McGee Ranch, and Corona de Tucson are the principal settlements in the Upper Santa Cruz Valley watershed, and the total population in the entire valley is currently estimated at only 31,030 people. Private lands, comprising some 35 percent of the land base, are located throughout the valley. While some 36 percent of these private lands, 57,102 acres, are classified as used for ranching or agricultural purposes, some 64 percent, 99,353 acres, of all private lands are categorized as non-agricultural lands. A significant area of these non-ranching private lands characterizes much of the west-central portion of the subarea that is dedicated to mining. Of these private non-ranch lands, some 28,872 acres are identified as mining use. This area to the south of the Tohono O'odham Nation adjoins the Sahuarita area, which is experiencing urbanization from the Tucson metropolitan area. As noted earlier, the Interstate-19 corridor, Sahuarita, and Green Valley essentially mark where the transition from ranching to real estate development is occurring. Some of these lands along the river floodplain remain in agricultural use by the Farmers' Investment Company (FICO), and other areas in the I-19 corridor have been zoned for high density development and formally platted. Elsewhere in the valley, developing areas reflect both formal subdivisions and lot-splitting or wildcat subdivision areas in Corona de Tucson, Elephant Head, Montana Vista, east of Arivaca, Madera Canyon, south of San Xavier, and along Old Nogales Highway. There are a total of 28,127 parcels and 292 subdivisions recorded with the Pima County Assessor's Office. Platted subdivisions cover 13,782 acres.

Ranches:

As noted earlier, much of the Upper Santa Cruz Valley was home to early Piman peoples some of whom were called Sobaipuri. At the time of Spanish contact in the 1690s, these Piman people were living and farming along the Santa Cruz River in dispersed river settlements. Spanish missions and settlements were soon established at Guevavi, Calabasas, Tumacacori, Tubac, San Xavier, and at Tucson. Once established, these mission communities became targets of Apache raids, and a presidio was established at Tubac to protect the Upper Santa Cruz Valley. While the Spanish Colonial government encouraged the establishment of land grants to encourage civilian settlement, no land grants were applied for until the beginnings of the Mexican period, which saw the establishment of the Canoa and Sopori land grants. Even so, these Mexican land grants could not be developed as ranches until significantly later due to Apache hostilities. It was not until the Gadsden Purchase of 1854 that the Upper Santa Cruz Valley experienced its second significant wave of immigrants who were largely American mining prospectors; however, permanent settlement of the region did not occur until after the Civil War and the cessation of Apache raids.

With the establishment of the Southern Pacific Railroad in 1880 to the north of the valley, the Upper Santa Cruz Valley became more easily accessible for exploration and settlement. With the success of agriculture and ranching along the Santa Cruz River and local silver, gold and copper mines at Greaterville, near Arivaca, and elsewhere in the nearby mountains, the railroad at Tucson provided rail access to ranchers and miners who could ship cattle and ore to distant markets. This resulted in greatly increased productivity in ranching and great wealth for those ranchers who had the foresight to buy land, water, and mineral rights to expand and diversify their holdings. The principal routes in the valley, the north-south Old Nogales Highway and Interstate-19, follow the route of the Spanish period Camino Real on the west side of the river that later became known as the "Tubac to Tucson Road." Canoa Ranch, certainly the largest ranch in the valley, became the social and economic hub of the Upper Santa Cruz Valley in the early years of the 20th century. Much of the original Canoa Ranch continues to be used in ranching.

Table IV-3.4 Ranches in the Upper Santa Cruz Valley Watershed in Pima County

Ranch/Lease Name	Private Land	State Lease	BLM	National Forest Lease
Andrada*		X		
Arivaca Ranch*	X	X	X	X
Aros		X		
Box Canyon	X	X		X
Byner	X	X		
De la Ossa*		X		
Dykman*		X		
Ethridge		X		
Gastelum	X	X		
Gun Sight*	X	X	X	
Hanley	X		X	
Madera	X	X		
Marley*	X	X	X	
Olivas		X		
Papalote	X	X		
Proctor				X
Rancho Seco*	X	X	X	
Rosemont*				X
Saddle Creek	X	X		
Santa Rita Ranch	X	X		X
Santa Cruz Ranch		X		
Sierrita Ranch	X	X	X	
Sopori Ranch	X	X		X
Twin Buttes Ranch	X	X	X	
Willow Springs*	X	X		

* Indicates ranches that overlap into adjacent watersheds.

Today, some 25 ranches, many of which include lands from the original Canoa and Sopori holdings and later homestead claims, continue in operation in this subarea. Lands used in ranching include some 57,102 acres of private lands, 27 state trust land grazing leases, 8 state trust grazing permits, 8 BLM leases of various parcels, and 9 National Forest leases.

These ranches are listed in the table shown above and are identified by either their ranch name or the name of the grazing lease. Please note that relatively small ranches comprised of only private lands are not noted below; however, their use of private lands in ranching is included in the total acreage in ranch use calculated for the entire watershed. These larger ranches, which include principally cow-calf and some steer or stock types of livestock operations, all utilize grazing and ranch management plans under which they implement their state and federal grazing leases.

Except for the active mines, platted and wildcat or lot-split subdivision areas, and the Green Valley, Sahuarita, and I-19 corridor areas, the Upper Santa Cruz Valley watershed has at least 308,285 acres of ranch lands, or about 74 percent of the entire watershed, excluding Indian lands. Lands not used in ranching or agriculture comprise some 109,787 acres or about 26 percent of the Upper Santa Cruz Valley watershed, again excluding Indian lands.

Of all private lands in the Upper Santa Cruz Valley totaling 156,455 acres, approximately 57,102 acres, or 36 percent, are used in ranching, and 99,353 acres, or about 64 percent, have other uses, such as mining which at 28,873 acres represents about 18 percent of all private lands. Much of the state trust lands, except for about 9440 acres, appears to be used in grazing, much of the BLM lands, except for 880 acres, and virtually all National Forest lands totaling some 41,034 acres are designated in grazing leases. Forest lands used in grazing leases distinguish between "capable" range land and "incapable" range land due to rugged terrain and poor access in the higher elevations. For the purposes of this analysis, however, it is assumed that all National Forest lands are available for grazing in this watershed.

Table IV-3.5 Ranch lands in the Upper Santa Cruz Valley Watershed in Pima County

Land Owner	Ranch Use	Non-Ranch Use	Total
National Forest	41,034 ac	(Rugged terrain?)	41,034 ac
State Trust Land	203,305	9,440	212,745
Indian Lands	?	?	31,612
BLM Lands	6,844	880	7,724
Active Mining	0	28,872	28,872
Other Private Lands	57,102	70,481	127,583
Unclassified		114?	114
TOTAL	308,285 ac	109,787 ac	449,684* ac

* If Indian lands are subtracted, the total acreage used in ranching represents 74% of Upper Santa Cruz. If it is assumed that Indian lands are also used for grazing, ranching then characterizes some 76% of the Upper Santa Cruz Valley.

Ranch improvements that have been made include ranch headquarters, residences, stables, corrals, irrigated pasture, fencing for lease boundaries and pasture rotation, roads and fire breaks, erosion control, and development of stock tanks and wells as water resources for cattle and wildlife. While many of these improvements have not been quantified for this report, water sources that are critical to the success of ranching and for maintaining livestocck and wildlife have been researched. It has been noted in the table above that

natural water sources are relatively abundant in the mountain areas, with 24 springs located mostly in the surrounding mountains, and there are about 30 miles of intermittent streams, including the Santa Cruz River course. To supplement natural water sources, approximately 527 stock tanks have been constructed over time. Wells, recorded for both domestic use, for cattle and wildlife, and other uses number 1931 for the entire Upper Santa Cruz Valley.

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 US Forest Service, 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 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 the Upper Santa Cruz Valley watershed ranges from 3 to 16 animals per square mile depending on the terrain, location of the lease, the health of the range, rainfall, and how it is used. At the present time the 9 National Forest grazing allotments, 8 BLM leases, and 27 State grazing leases or permits allow for a maximum of 4315 animals to be grazed in the entire Upper Santa Cruz Valley watershed in Pima County. When this number is considered together with the total acreage of 308,285 acres or 482 square miles, dedicated to ranching, the maximum average number of animals allowed to be grazed is approximately 9 animals per square mile. Grazing capacity corresponds with higher elevation and rainfall as shown on the enclosed figure. However, please note again that this number reflects only today's range conditions and lease terms. The total number of animal units is likely to be changed in the future dependent on climate, rainfall, vegetation cover, and range health.

Table IV-3.6 Animal Units Allowed to be Grazed in the Upper Santa Cruz Valley

Range of AUs Allowed	Acres/Sq.Miles in Grazing	Total AUs Allowed	Avg.AU/Sq.Mi.
3 - 16	308,285 ac. or 482 Sq.Mi.	4315	8.9

In addition to grazing, federal and state public lands may be used for hunting, fishing, hiking, riding, and other recreational uses. Although these kinds of uses have not yet been fully quantified, statistics provided by the US Forest Service indicate significant numbers of visitors to Madera Canyon and other recreational areas. While this has not been quantified, it is likely that recreational use of public lands in the Upper Santa Cruz Valley watershed is quite high given its proximity and easy access to the Tucson area.

Current Farms:

At the present time, agricultural lands are located primarily in the Santa Cruz River floodplain with some irrigated pasture noted along Sopori Creek. Available GIS data for vegetation suggest there are some 13,182 acres of land that were recently used for crops and pasture in the Upper Santa Cruz Valley, and that historically this number could be as high as 18,629 acres. However, Assessor records show only 7,359 acres currently classified for agricultural use today, and much of this land is classified as "prime farmland" by the US Department of Agriculture.

Most of this decrease in agricultural lands reflects the transition of farms to real estate development in the Santa Cruz Valley floodplain, principally in the northern portion of the historic Canoa land grant, which has been transformed into the Green Valley community. GIS data suggest that irrigated farms were once the predominant use of the bottomlands of the Santa Cruz River floodplain and included both food and fiber crops and pasture.

Using Assessor records, the total area in the Upper Santa Cruz Valley currently in agricultural use is 7,359 acres. Much of this agricultural use today includes about 5,000 acres of pecan orchards owned and operated by Farmers Investment Company. Approximate acreages for current and historically irrigated agricultural lands are provided below.

Table IV-3.7 Current Farms or Irrigated Pasture in the Upper Santa Cruz Valley in Pima County

Acres Ever in Agriculture	Food or Fiber Crops	Irrigated Pasture	COT parcels
18,629 ac*	5000? ac	2359 ac	1282 ac

* GIS vegetation data suggest 13,182 acres.

Development Pressure & Threats to Ranching:

Development pressure in the Upper Santa Cruz Valley watershed in Pima County is variable, but certainly dependent on transportation corridors, proximity to the urbanizing Tucson area, and in areas adjacent to existing platted or wildcat subdivisions. As noted above, growth and urbanization is greatest in the Santa Cruz River and Interstate 19 corridor in the Green Valley-Sahuarita area and in the Corona de Tucson area in the northwest portion of the watershed near the Tucson City limits. Farther south in the Canoa Ranch area, plans for the development of the remaining Canoa Ranch property totaling about 6400 acres have been proposed, but are currently unresolved. Other rapidly developing areas include the private lands to the south of the San Xavier District in the vicinity of the ASARCO mines. With urbanization expanding south along the I-19 corridor and Old Nogales Highway, it is possible that the remaining agricultural lands and other private lands will be eventually sold for development as land values increase. While some of these lands are still grazed, ranching will not be viable for long as the transition of ranch lands to real estate continues to increase along this corridor.

In fact, it is just those ranches and grazing leases that adjoin the urban area and I-19 corridor that are most vulnerable to development. With increasing land values in these areas and

higher development potential, the State Land Department has established 5 year time limits on 16 grazing permits called Special Land Use Permits (SLUPs) throughout eastern Pima County. These lands have been essentially reclassified for commercial use by the ASLD in anticipation of sale or lease of these lands for commercial or residential development. Portions of eight state SLUPs for grazing occur in the Upper Santa Cruz Valley subarea. These SLUPs comprise some 49,000 acres, or 77 square miles, and represent some 11 percent of the entire watershed. These lands are located in the vicinity of the ASARCO mines and along the I-19 corridor. The very largest area identified for commercial use extends from Los Reales Road south to the Santa Rita Experimental Range, west to the Santa Cruz River and east to Corona de Tucson. Under the terms of the SLUP, the rancher can be evicted in 30 days even if the 5 year permit is still current, and there will not be any reimbursements for any improvements to the land, as is customary for long-term grazing leases. Should these State SLUPs be sold or leased for development, a total of 49,000 acres of State land in the Upper Santa Cruz Valley will be removed from grazing use, diminishing the animal unit capacity regionally by about 693 head of livestock.

As a consequence of existing, planned, and anticipated development, the "urban boundary" in the Upper Santa Cruz Valley may be defined by the boundaries of long-term grazing leases located in the uplands to the east and west of the Santa Cruz River, with virtually no east to west continuity of natural open space or grazing lands that cross the river. As development continues along the I-19 corridor and expands in area, these remaining ranch areas will become increasingly isolated from ranching areas across the valley.

At the present time, there are 292 platted subdivisions comprising some 13,782 acres in the entire Upper Santa Cruz Valley watershed in Pima County, and there are a total of approximately 28,127 recorded parcels of land. Approximately 15,860 acres have already been characterized as urbanized area in the Upper Santa Cruz Valley.

Areas of ranch land fragmentation may be defined as those parcels that are not used in ranching and that have been subdivided or have the potential to be subdivided. Approximately 99,353 acres, or 64 percent, of all of private lands are currently not used in ranching. Of this total nearly 29,000 acres are dedicated to mining, leaving about 70,000 acres that may be developed. When reviewed on a map, these areas of non-ranch private land holdings cluster in the areas of the ASARCO mines, along Old Nogales Highway, in Green Valley, Continental, and Sahuarita, in the Corona de Tucson area, in the Montana Vista, Elephant Head and Madera Canyon areas, and to the east of the Arivaca area. With these exceptions, the remaining upland portions of the Upper Santa Cruz Valley represent largely unfragmented ranch lands. These lands occur to the west of Green Valley adjoining the Altar Valley and south to Santa Cruz County. To the east of Green Valley, unfragmented ranch lands currently extend from Interstate-10 south to the Santa Rita Experimental Range to the Coronado National Forest and Empire-Cienega Valley, and south to Santa Cruz County. This remaining unfragmented ranch land and natural open space is comprised of predominantly State land and private lands, some Forest Service lands, and a few parcels of BLM land.

At the present time, there are a number of Pima County Specific Plan areas, including Quail Creek and Las Campanas, among others, and Rancho Sahuarita in Sahuarita that will be eventually developed into planned communities comprised of mixed residential, commercial, and resort oriented uses. The planned development at Canoa Ranch is not yet resolved, but portions of some of these specific plan and rezoned areas are currently leased for grazing.

Where this occurs, the developer retains and uses ranch land designation by the Assessor's Office to lower property taxes while waiting for the opportune time to develop the area for high density residential or commercial use.

In addition to the proposed specific plan areas and existing subdivisions, the BLM has identified various parcels for either sale, trade, or commercial lease that total some 7857 acres in this watershed. While the BLM has parcels located throughout the valley, the State Land Department has identified two large tracts of state land, comprising some eight grazing permits for commercial use.

Specifically, the ASLD has identified eight Special Land Use Permit (SLUPs) areas located in the developing northern portions of the watershed. As described above, these State SLUPs are grazing lands in transition that have been reclassified by ASLD for commercial use. These State lands comprise some 49,000 acres within the watershed. While BLM land totaling some 7,728 acres has also been identified for sale or exchange, these parcels are scattered throughout the watershed, and some in rural areas are likely to remain in ranch use or as open space. There is a much higher probability that the ASLD SLUP parcels identified for commercial sale or lease will be developed because of their proximity to the developing urban area and their location along the I-19 corridor.

In summary, the development pressure in the Upper Santa Cruz Valley watershed in Pima County is variable at the current time, but significant along the I-19 corridor. In the southern and upland portions of the Upper Santa Cruz Valley, development pressure is relatively low due to the stability of ranch land use, largely unfragmented private and public lands, the lack of committed high density zoning, and the distance from any major transportation corridors such as Interstate 19. The principal threat to the stability of ranching in these portions of the valley is likely to be due in the future to the transition of private ranch lands to real estate, especially in the areas adjacent to existing development.

In the northern portion of the Upper Santa Cruz Valley, urbanization is occurring near the Tucson City limits and in the vicinity of Sahuarita, Green Valley, and along the I-19 corridor.

Ranch Land Conservation Potential:

Unlike the adjoining Empire-Cienega and Altar valleys, which retain significant integrity of natural open space and ranch lands use, the Upper Santa Cruz Valley is significantly more threatened by urbanization and strip development from the Tucson urban area and along the I-19 corridor.

While there is good potential for the east and west upland portions of the Upper Santa Cruz Valley to remain in ranching, development pressure in the northern portion of the valley and along the river corridor effectively split the open space and ranch use of the valley into two halves. Contributing to the sustainability of ranching in these upland areas are the stability and long-term tenure of ranch lands comprised of private lands, State lands, BLM, and National Forest leases, low population pressure outside the urbanizing northern and central portions of the valley, proximity to existing preserves that allow grazing; a high proportion of productive grasslands; good average rainfall; and relatively high grazing capacity.

Assuming that the Upper Santa Cruz Valley watershed will continue to be subject to urban expansion along the I-19 corridor, the overall ranch land conservation potential is perhaps lower in comparison to some of the other subareas of Pima County. Ranch land conservation is likely to continue to be variable -- the upland areas are likely to remain relatively stable, while other portions of the Upper Santa Cruz Valley, especially along the I-19 corridor from Sahuarita to Green Valley, will continue to be susceptible to fragmentation and development.

Summary & Conclusions:

To conclude, portions of the Upper Santa Cruz Valley watershed continue to support stable and sustainable ranching operations especially in the upland areas of the valley in large part because of its environmental setting, the connectivity of its ranch lands and open space, the significant amount of public lands, and the lack of development infrastructure. The principal vegetation type is scrub grasslands, which comprises some 63 percent of the vegetation in the subarea.

Except for the urbanizing Green Valley-Sahuarita areas, the ASARCO mines, and other small subdivisions, the valley remains largely rural, and a high proportion of the land area, some 308,285 acres, approximately 74 percent of the land in the subarea, is used in ranching and agriculture. This includes 57,102 acres, or 36 percent, of all private lands. Some 109,787 acres of public and private lands, or approximately 26 percent, of the valley, are not used for ranch purposes, and Indian lands comprise some 31,612 acres.

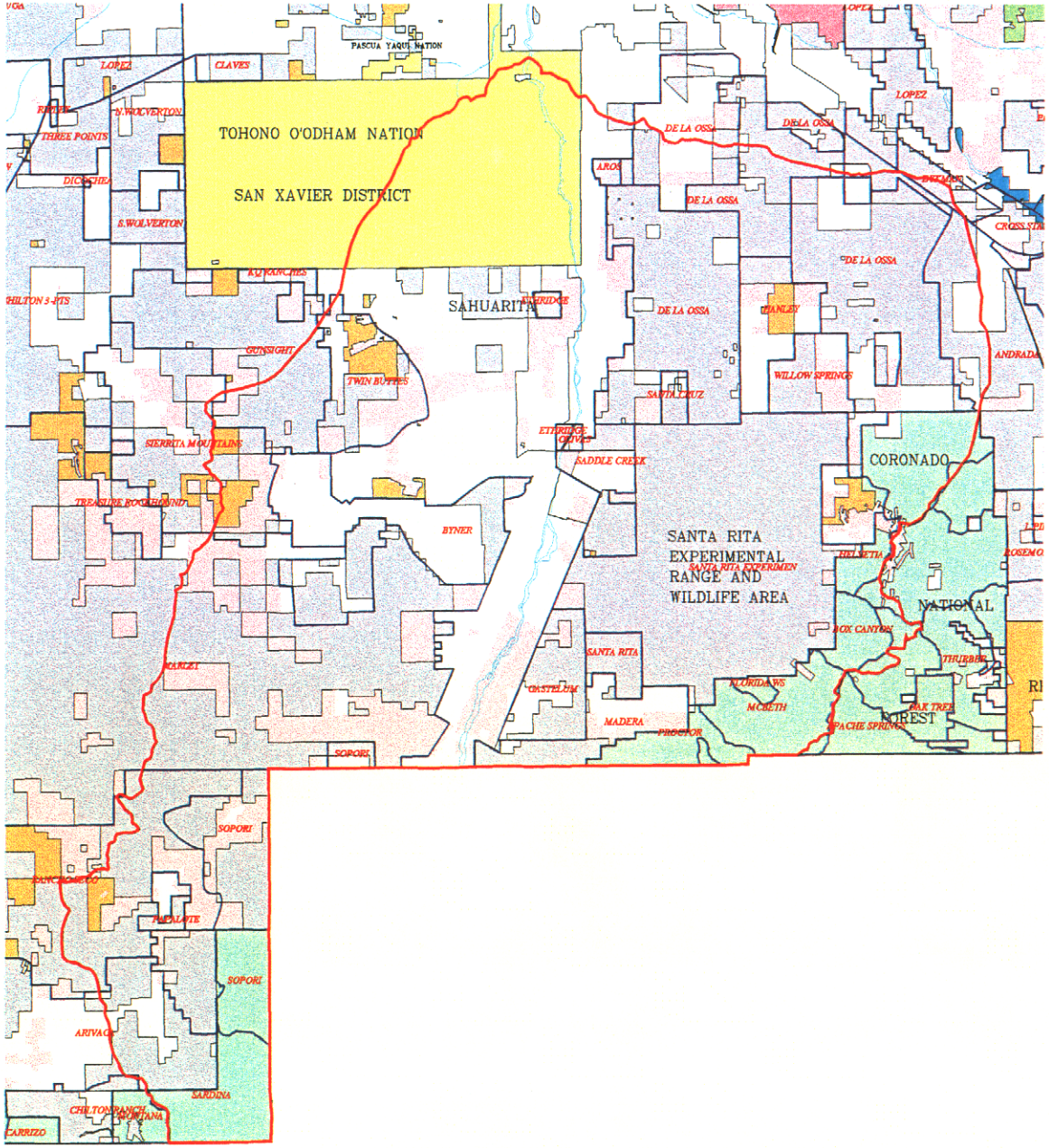
At the present time there is limited threat from development pressure in the upland portions of the valley; however, urbanization of the central portion of the valley and the reclassification of some 49,000 acres by the State Land Department for commercial use poses a very significant future threat to sustainable ranching in this valley.

Furthermore, because the Santa Rita Experimental Range of 53,000 acres has been transferred to the State Land Department from the federal government, it is possible that this historic ranch and research station could be similarly reclassified from its use for grasslands research by the University of Arizona and be made available in the future for commercial sale, lease, and development. Moreover, the disproportionate amount of State Trust Land, some 47 percent of the valley, together with all the private land, some 35 percent of the valley, suggests that some 82 percent of the Upper Santa Cruz Valley could be developed in the future.

Because of these significant threats of urban expansion, the Upper Santa Cruz Valley currently appears to have a mixed potential to continue sustainable ranching -- high in some of the upland areas and only low to moderate in the northern and central portions of the valley.

Ranch Lands and Grazing Allotments

SDCP PLANNING UNIT 3

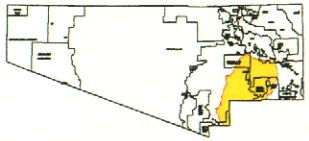


STATISTICS FOR PLANNING UNIT 3

BLM	7,724	AC
COUNTY PARK	0	AC
MILITARY RESERVATIONS	0	AC
INDIAN LANDS	31,612	AC
NATIONAL FOREST LANDS	41,034	AC
NATIONAL PARKS AND MONUMENTS	0	AC
STATE LANDS	212,745	AC
STATE PARKS	0	AC
PRIVATE LANDS RANCH USE	57,102	AC
PRIVATE LANDS NON-RANCH USE	99,353	AC

- 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

Pima County Index Map



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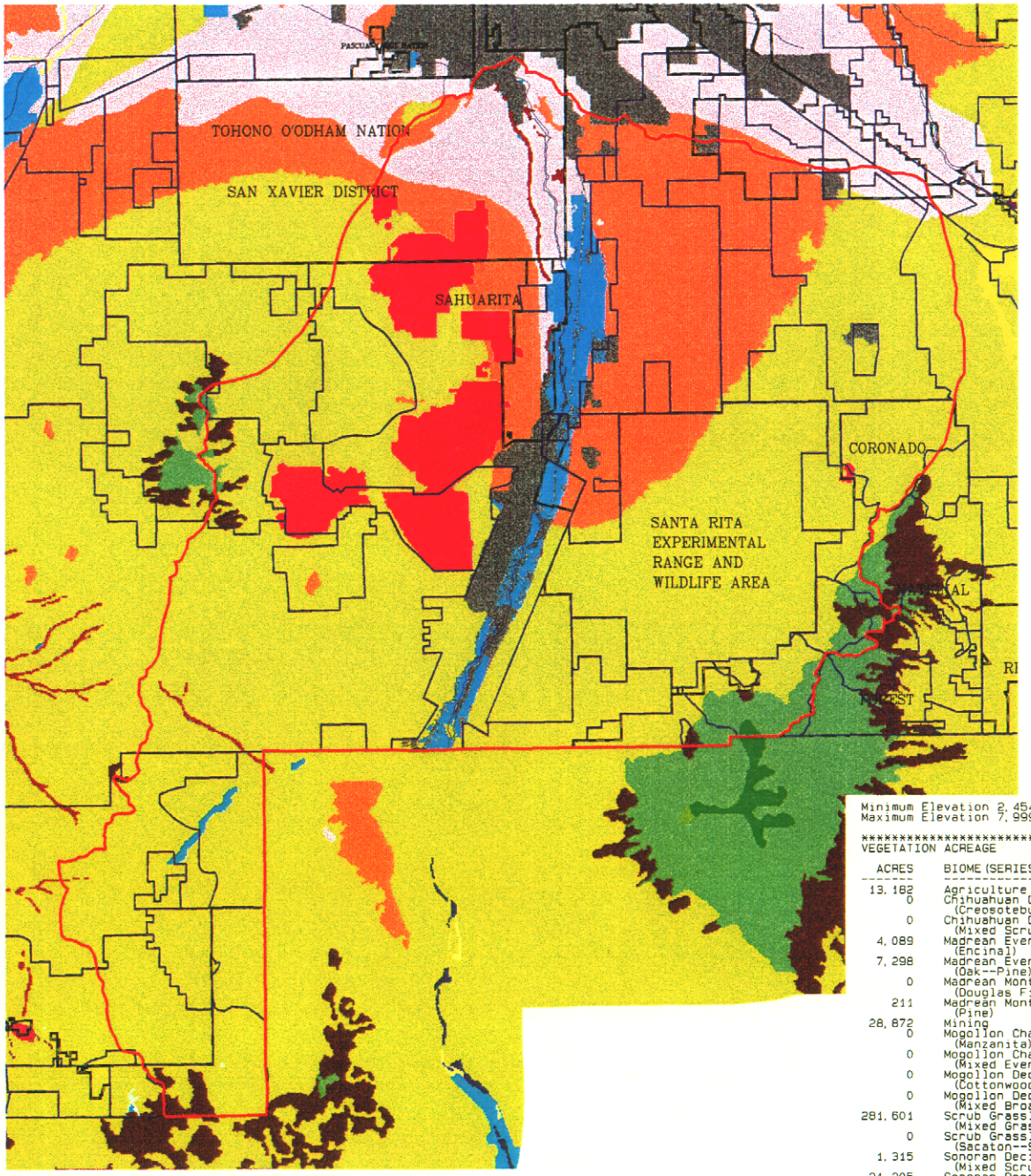
GAP Vegetation and Grazing Allotments

SDCP PLANNING UNIT 3



Minimum Elevation 2,454
Maximum Elevation 7,999

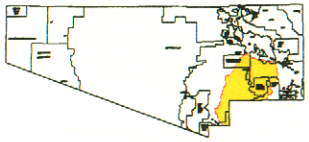
****

VEGETATION ACREAGE

ACRES	BIOME (SERIES)
13,182	Agriculture
0	Chihuahuan Desertscrub (Creosotebush--Tarbush)
0	Chihuahuan Desertscrub (Mixed Scrub)
4,089	Madrean Evergreen Forest (Encinal)
7,298	Madrean Evergreen Forest (Oak--Pine)
0	Madrean Montane Conifer Forest (Douglas Fir--Mixed)
211	Madrean Montane Conifer Forest (Pine)
28,872	Mining
0	Mogollon Chaparral Scrubland (Manzanita)
0	Mogollon Chaparral Scrubland (Mixed Evergreen)
0	Mogollon Deciduous Swampforest (Cottonwood--Willow)
0	Mogollon Deciduous Swampforest (Mixed Broadleaf)
281,601	Scrub Grassland (Mixed Grass--Scrub)
0	Scrub Grassland (Sacaton--Scrub)
1,315	Sonoran Deciduous Swamp and Riparian Scrub (Mixed Scrub)
21,205	Sonoran Desertscrub (Creosotebush--Bursage)
75,914	Sonoran Desertscrub (Paloverde--Mixed Cacti)
0	Sonoran Riparian and Oasis Forest (Cottonwood--Willow)
15,860	Urban
138	Water

- Watershed Planning Unit Boundary
- Grazing Allotments
- Administrative Boundaries
- Washes
- Agriculture
- Urban
- Mining
- Chihuahuan Desertscrub (Creosotebush--Tarbush)
- Chihuahuan Desertscrub (Mixed Scrub)
- Chihuahuan Desertscrub (Whitethorn)
- Madrean Evergreen Forest (Encinal)
- Madrean Evergreen Forest (Oak--Pine)
- Madrean Montane Conifer Forest (Douglas-Fir--Mixed Conifer)
- Madrean Montane Conifer Forest (Pine)
- Mogollon Chaparral Scrubland (Manzanita)
- Mogollon Chaparral Scrubland (Mixed Evergreen Sclerophyll)
- Mogollon Deciduous Swampforest (Cottonwood--Willow)
- Mogollon Deciduous Swampforest (Mixed Broadleaf)
- Playa
- Scrub Grassland (Mixed Grass--Scrub)
- Scrub Grassland (Sacaton--Scrub)
- Sonoran Deciduous Swamp and Riparian Scrub (Mixed Scrub)
- Sonoran Desertscrub (Creosotebush--Bursage)
- Sonoran Desertscrub (Paloverde--Mixed Cacti)
- Sonoran Desertscrub (Saltbush)
- Sonoran Interior Marshland (Cattail)
- Sonoran Riparian and Oasis Forest (Cottonwood--Willow)
- Unclassified/Mixed
- Water

Pima County Index Map



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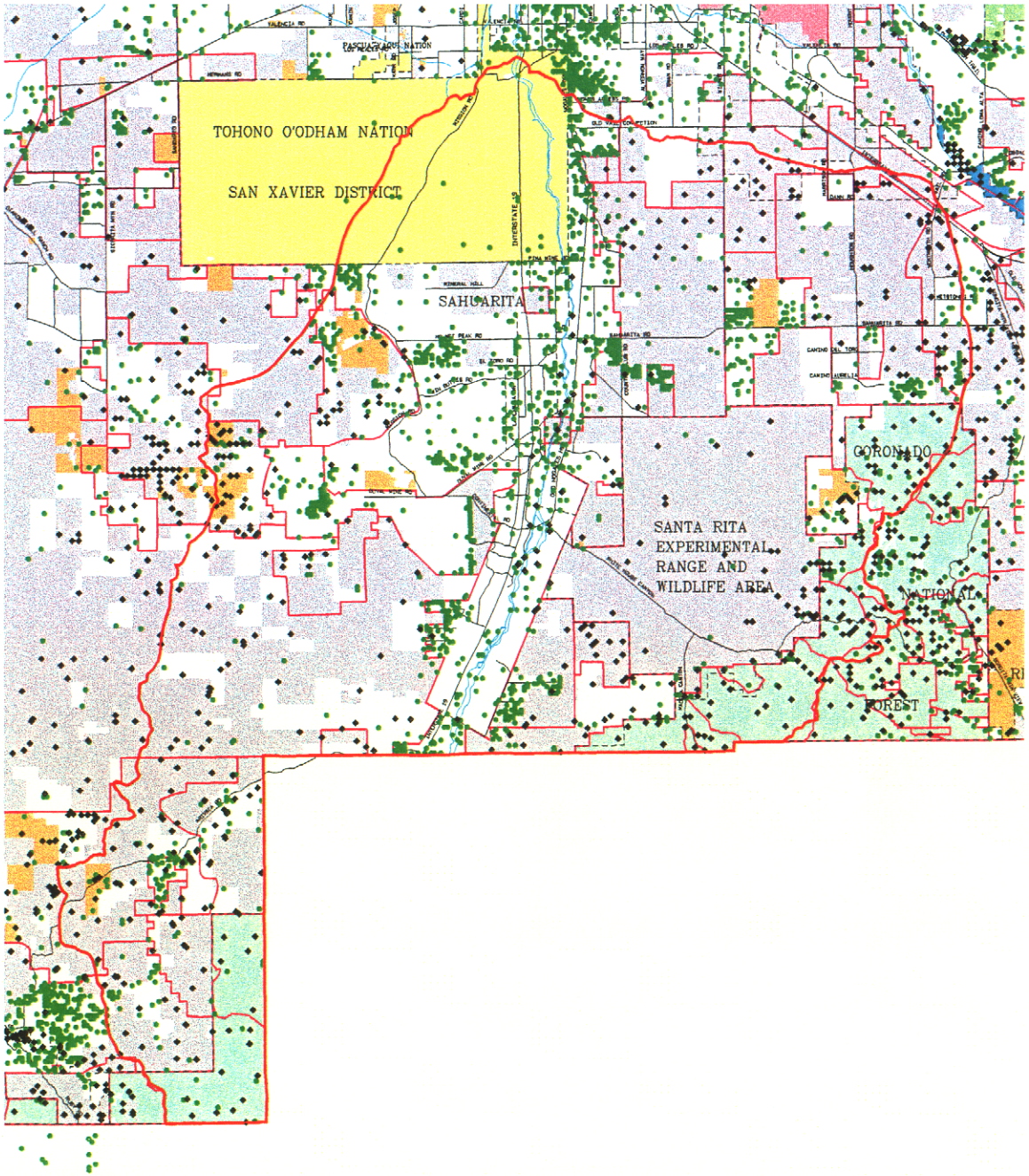
Stock Tanks and Well Sites



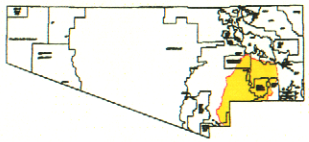
SDCP PLANNING UNIT 3

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

STATISTICS FOR UNIT 3

Well Sites:	1,931
Stock Tanks:	527

Pima County Index Map



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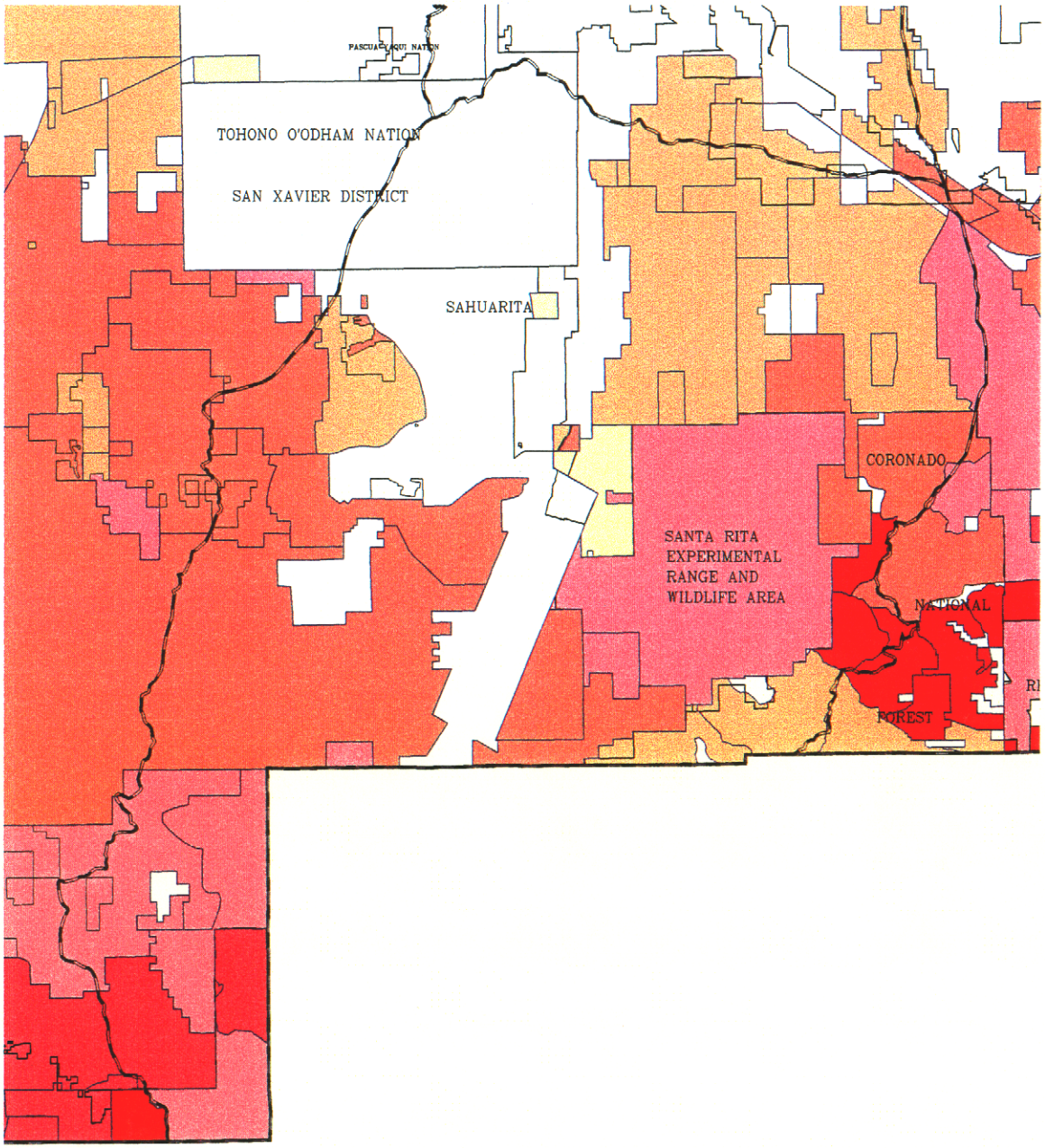
Carrying Capacity per Square Mile by Grazing Allotment

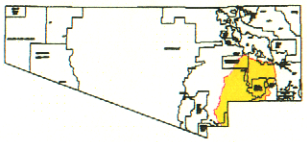
SDCP PLANNING UNIT 3



- 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

Pima County Index Map



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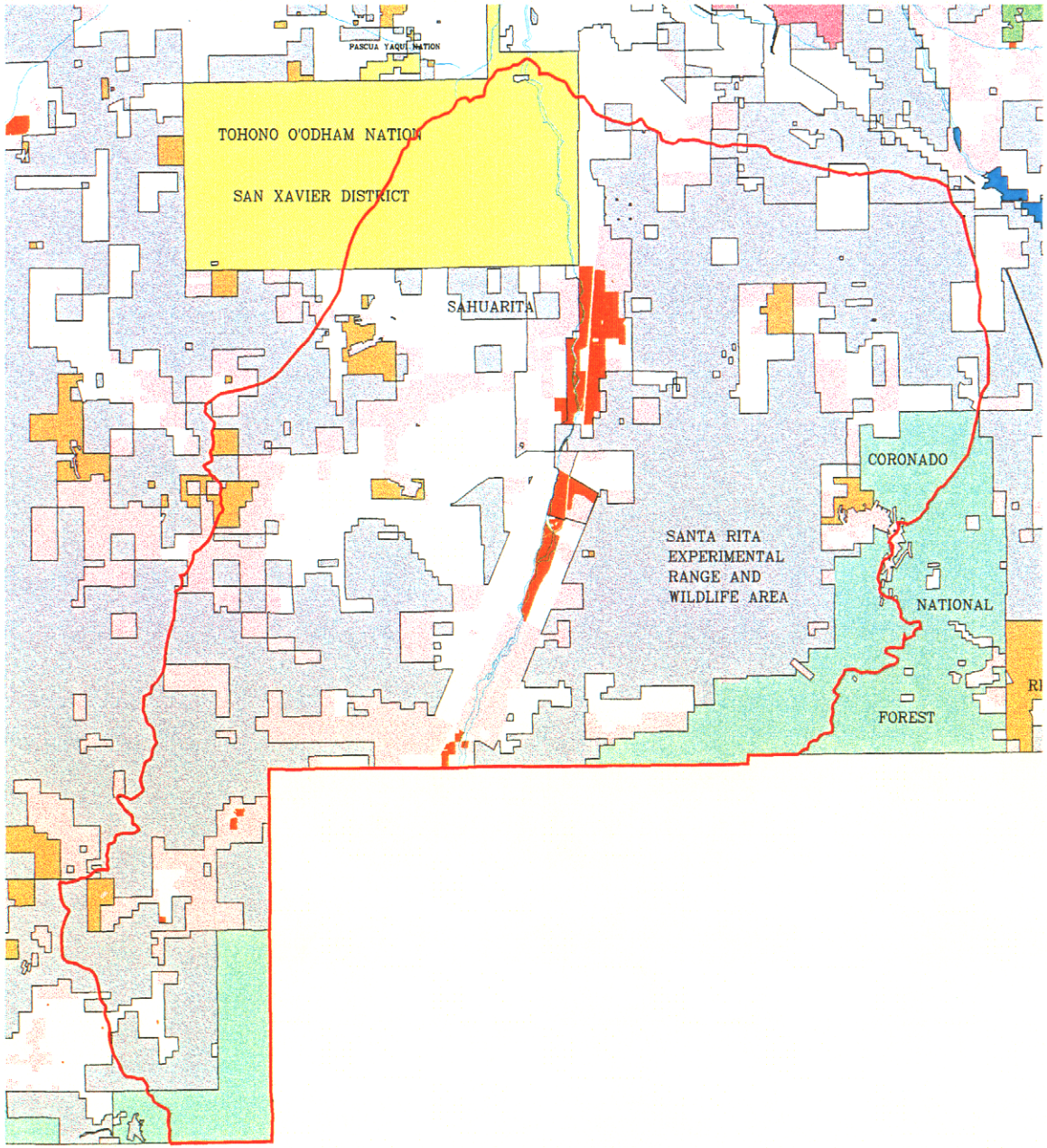
Agricultural Lands



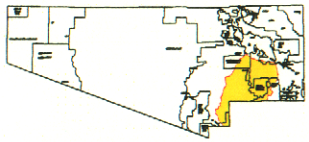
SDCP PLANNING UNIT 3

- 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

STATISTICS FOR UNIT 3

ACRES OF AGRICULTURAL LAND: 7,359

Pima County Index Map



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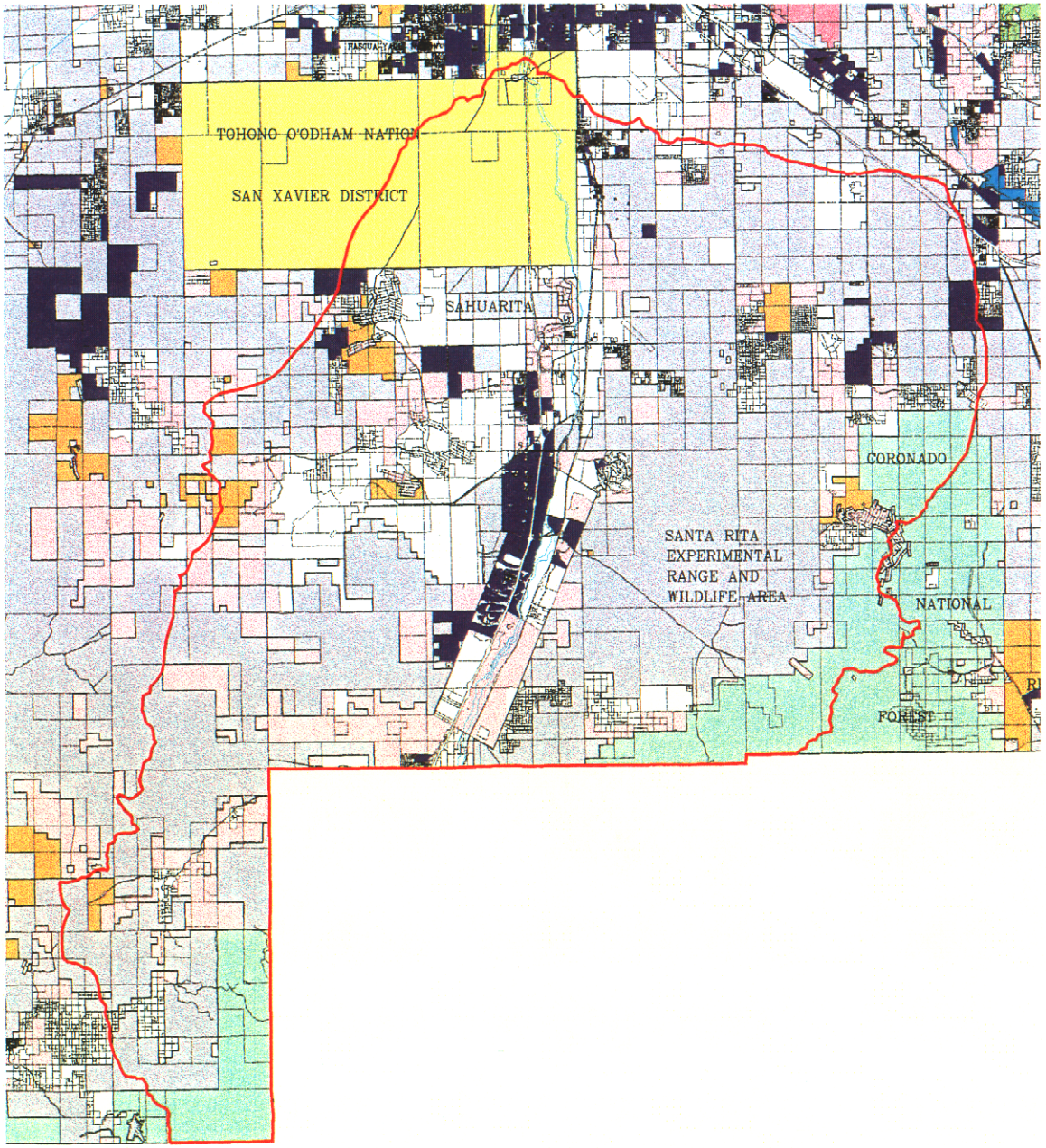
/pygmyowl2/sonora/cultural/asmjoined/plan3/amls/ranch_ag3.aml 5/3/00



Platted Subdivisions

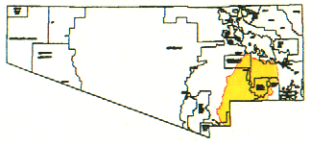
SDCP PLANNING UNIT 3

- 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

STATISTICS FOR UNIT 3

NUMBER OF PLATTED SUBDIVISIONS:	292
ACRES OF PLATTED SUBDIVISIONS:	13,782
NUMBER OF PARCELS:	28,127

Pima County Index Map



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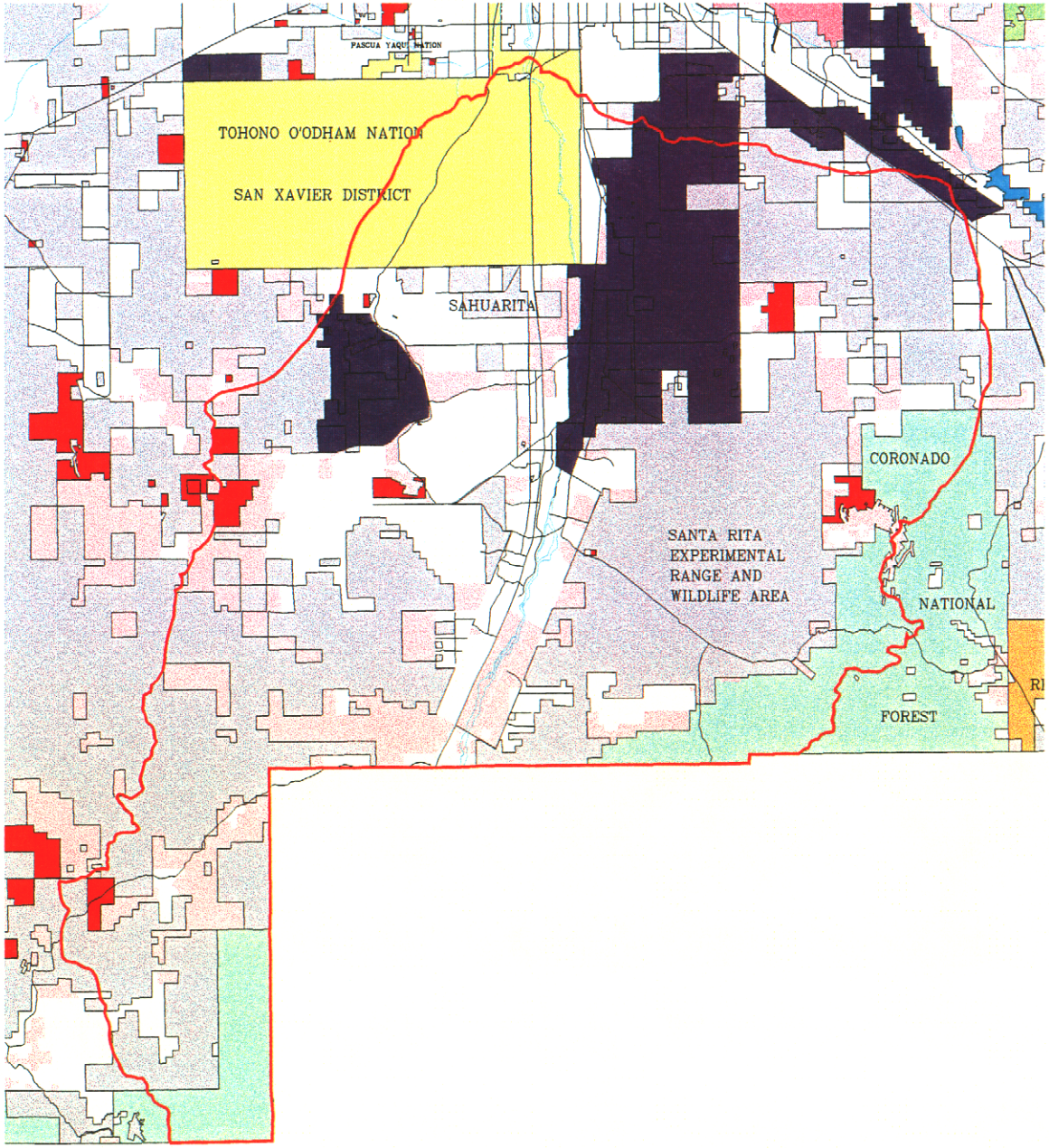
Disposable Lands for BLM and State of Arizona



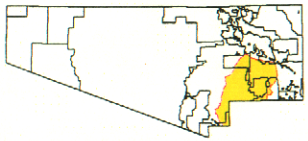
SDCP PLANNING UNIT 3

- Planning Unit Boundary
- Major Washes
- Disposable BLM Land
- Disposable State Land
- 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

STATISTICS FOR UNIT 3

DISPOSABLE BLM LAND:	7,728 AC.
DISPOSABLE STATE LAND:	49,085 AC.

Pima County Index Map



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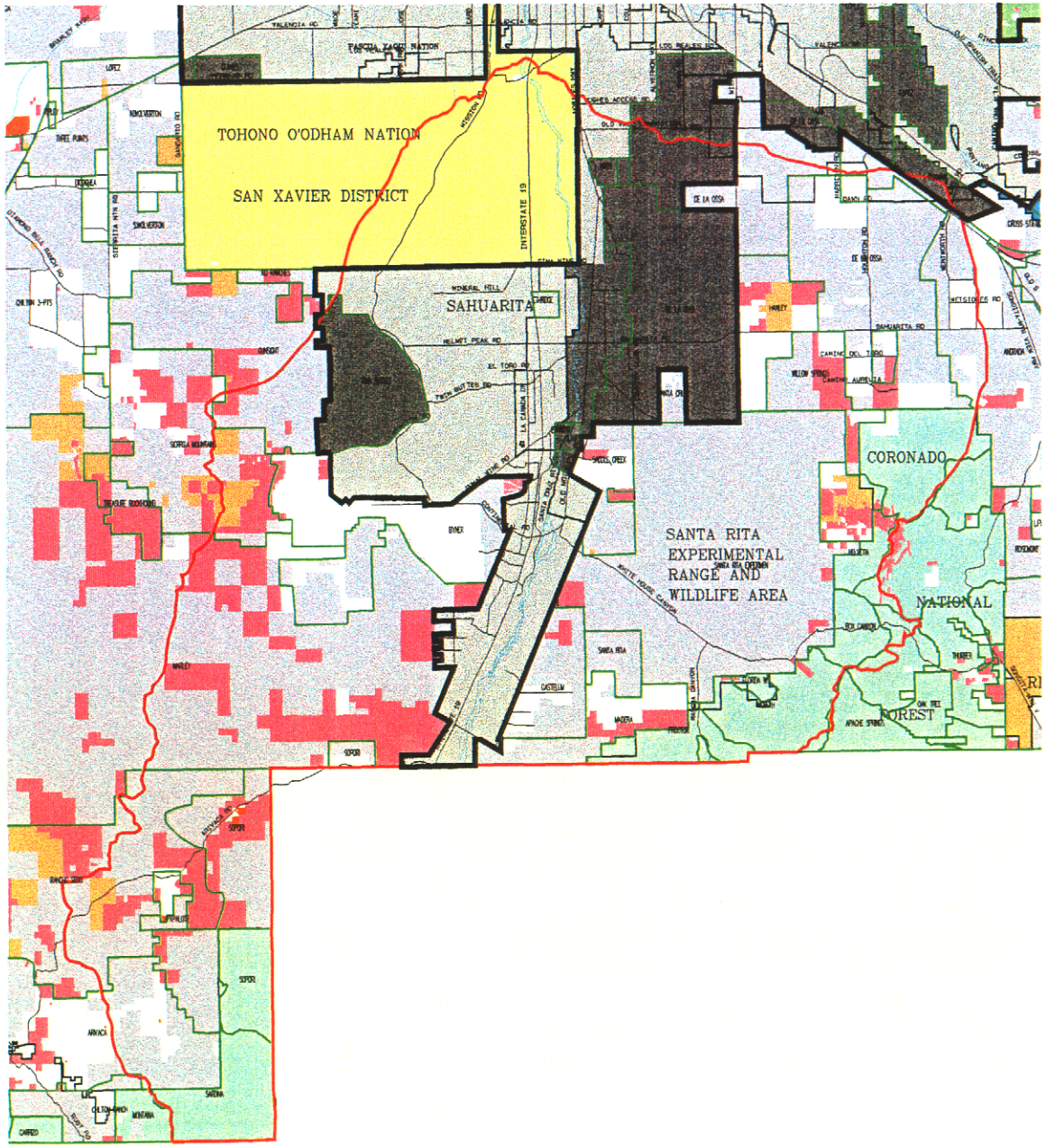
pygmyowl2/sonora/cultural/asnjoined/plan3/amls/ranch_disp3.aml 5/3/00

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



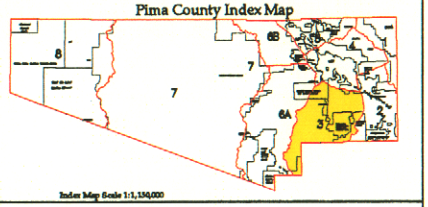
SDCP PLANNING UNIT 3

- 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 LANDS
- STATE PARK
- RANCH USE
- AGRICULTURAL USE
- Urban Boundary
- ASLD / SLUP's

STATISTICS FOR UNIT 3

ACRES OF ASLD/SLUP's 49,085

Pima County Index Map



Index Map Scale 1:1,134,000

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Scale 1:90,000

PIMA COUNTY DEPARTMENT OF TRANSPORTATION
TECHNICAL SERVICES

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/pygmyowl2/sonora/cultural/asmjoined/plan3/amls/ranch_urban3.amPlotted: 6/3/00

IV-4. Ranching in the Middle Santa Cruz Valley

Introduction:

The entire Santa Cruz Valley including the Tucson area was historically one of the most significant ranching valleys in southern Arizona. At the heart of the valley is the Santa Cruz River, once a reliable if not perennial source of water along certain reaches. The river and its floodplain were a focus of Native American settlement and agriculture, the historic corridor of Spanish Colonial exploration and mission settlement, and the location of Spanish and Mexican period land grants, which established some of the first ranches in southern Arizona. El Camino Real was also the principal route of travel, and linked Colonial New Spain with Tucson, the military and mission settlement at the northern frontier of the Spanish colonial empire.

Since its settlement as a Spanish Colonial Presidio in 1775, some 225 years ago, Tucson has grown from about 400 people to more than 480,000 in the City limits today and more than 600,000 in the entire metropolitan area. The City has expanded its incorporated boundaries from its original 13 acres defined by the Tucson Presidio walls to 124,800 acres.

At the present time, Tucson continues to grow at a rapid rate. The City of Tucson was the 45th largest city in 1980, 34th in 1990, and was 31st largest in 1996. The City grew by 22.6 percent in population and 61percent in area between 1980-90. Tucson's present size is 195.404 square miles. The estimated population for July 1,1999, was 475,450. Currently, the population is estimated to be 482,932.

The City limits are generally bounded by the Santa Catalina Mountain range, Saguaro National Park east and west, Tucson Mountain Park, and the San Xavier District of the Tohono O'odham Nation; however, the surrounding metropolitan area now includes suburban areas that remain in unincorporated Pima County, such as the Catalina foothills area, as well as the incorporated towns of Marana, Oro Valley, and Sahuarita. Inside the Tucson City limits is the City of South Tucson located just south of downtown Tucson. Beyond these towns, suburbs, and public preserves and parks, the urban boundary may be best defined by ranch lands, both public and private lands currently used in ranching, which mark the urban to rural transition.

Since 1980, the City of Tucson expanded its incorporated limits by more than 60 percent, and with continued population growth and urban expansion, there is continued conversion of ranch lands and natural open space into residential and commercial development at the edges of this urban boundary. Faced with rapid growth, the greater community is once again engaged in the growth debate concerning how to control urban sprawl, maintain open space, conserve water, allow public recreation, and protect cultural and natural resources, while acknowledging that growth in the region is ongoing.

As a consequence of the largely urbanized nature of the Tucson Basin and the development trends along the Interstate 10 and19 corridors, ranching barely continues in the Middle Santa Cruz Valley. Those areas where ranching continues are discontiguous and limited to portions of the Coronado National Forest and in the far southeastern portion of the valley at the

eastern edge of the City limits. Environmentally, the remaining ranch lands tend to be located in the upland areas near Redington Pass in the Santa Catalina Mountains and in lower elevation areas characterized by creosote-bursage and desert scrub vegetation.

Historical Summary of the Middle Santa Cruz Valley:

With the discovery of a Clovis spear point near the Santa Cruz River, the initial occupation of the Tucson Basin could be as early as 10,000 B.C. Previous archaeological investigations indicate that people have occupied southern Arizona for at least 11,000 years. Three major prehistoric archaeological time periods, Paleoindian, Archaic, and Hohokam are recognized in the Middle Santa Cruz region. Prehistoric sites were predominantly Hohokam sites (ca. A.D. 700-1450), but some sites dating to the earlier Archaic Period (ca. 5000-1000 B.C.) are also present.

Late Archaic sites have recently been found to represent a considerable occupation in the Tucson Basin in areas along the Santa Cruz River with reliable water. Given the water reliability at Tucson, it is possible that the urban area has seen nearly continuous occupation for the last 3000 years, if not longer. In addition to large village complexes along the upper floodplain, seasonal habitation and limited activity sites associated with plant procurement and processing are also known to be present. Houses took the form of shallow, round pit houses, and the artifact assemblage was comprised largely of stone tools and ground stone, with no pottery vessels. Increasing reliance on agriculture and the beginnings of ceramic technology mark the transition to what archaeologists have termed the Hohokam sequence of occupation.

The Hohokam were a sedentary agricultural society who constructed houses built in shallow pits and later as above ground pueblo-like structures of rock and adobe. They produced both plain and decorated pottery and other crafts using shell, stone and clay. Villages tended to be organized into clusters of pit houses probably representing extended family groups, and public architecture in the form of ballcourts which gave way to later platform mounds were typical. Agricultural intensification is evidenced by use of the irrigable floodplain, as well as use of upland areas where dry farming and cultivation of agave became increasingly common. By the late Classic period, many of the villages were abandoned, and populations aggregated into a smaller number of large integrated pueblo communities typically enclosed by a compound wall. While the causes of the decline of the Hohokam are not fully defined, some stresses may have been environmental, limits to food production, increased population pressure, conflict from changes in political and trade alliances, and perhaps social and religious issues. Whatever the suite of factors, by the end of the Classic period, the great cultural traditions of the Southwest, the Hohokam, Anasazi, and Mogollon, ended, and populations dispersed, marking the end of the Classic Period by about A.D. 1450.

Following the demise of the Hohokam tradition and the abandonment of the large villages, the ensuing period is not well-documented or well-understood. Social and economic changes are significant, with evidence for much lower organizational and socio-political complexity. The archaeological record is sparse and fragile suggesting mobility and small group size. By the time the Spanish arrive in the 1690s, these people are identified linguistically as northern Pimans. Settlement was dispersed into small groups living along river courses in simple brush

structures pursuing an agricultural economy supplemented by hunting and gathering. Despite these considerable changes, the Pima and Tohono O'odham consider the Hohokam their ancestors, as do some of the Hopi clans.

The very first Spanish entradas to venture into southern Arizona in the 1690s were relatively late in comparison to earlier explorations elsewhere in the Southwest. Father Kino's arrival in southern Arizona was indeed a landmark event that brought significant changes in social and economic life as well as religious beliefs. In 1691, Kino first traveled from Sonora north along the Santa Cruz River to the Piman villages of Tumacacori and Guevavi. In 1694, he traveled north to the settlements at Bac and "stjuckshon," called San Cosme de Tucson by Kino. In his travels north from San Xavier, Kino noted there were four Piman villages including Tucson, and the northern most, he called San Agustin de Oaiur. The very first mission was established at Guevavi and its "visita" at Tumacacori. The northernmost mission, San Xavier del Bac was established by Kino in 1700 to serve the Tucson area. The route connecting these missions in the Santa Cruz River valley between Sonora and Tucson were eventually protected by presidio garrisons as along other Caminos Reales elsewhere in New Spain.

With growing unrest among the Piman mission communities and increased pressure from Apache raiding, the Spanish military assumed increasing power over the communities almost exclusively served by the Missionaries. Following the Piman Revolt of 1751, a military presidio or garrison was established at Tubac in 1753. Efforts to "reduce" or concentrate the native Pimans into larger aggregate communities were increased. This concentration unfortunately created rich raiding opportunities for Apaches who repeatedly attacked these settlements.

By the 1770s, Apache raiding was so devastating on the San Pedro River that the presidio of Terrenate was transferred. It lasted only four years before being transferred again. The native Sobaipuri abandoned their villages and joined the Tucson area settlements, leaving the Apaches to refocus their raiding on the Tucson mission villages. As a consequence of Apache raiding on the Tucson villages and to secure some protection for the route to Alta California, the Tubac presidio was relocated to Tucson in 1775, and the Tucson villages were "reduced" to Bac and Tucson. Also at this time, the Juan Bautista de Anza expedition from Sonora to establish a settlement at San Francisco followed the route of the Camino Real along the west bank of the Santa Cruz River. Journeying north from Tubac, the expedition camped at "La Canoa," which is the first campsite location mentioned in the 1775 Spanish journals, "Llano Grande" near Sahuarita, at San Xavier, at "Tuquison" north of Sentinel Peak, at "Llano del Azotado" at the north end of the Tucson Mountains, and at "Oitipars" near the Pinal County line.

Spanish and Mexican Ranches in the Middle Santa Cruz Valley:

In the Tucson Basin, the mission settlements of San Xavier and San Agustin del Tucson were the principal areas where cattle ranching began with the introduction of cattle by Kino in the late 1690s. Kino brought cattle in large numbers to his Arizona missions - 700 were brought to San Xavier alone, and these herds became the mainstay of the mission economies and a major attraction for Indian converts and unfortunately a target for Apache raiding. Because of this very raiding, cattle ranching and human settlement were restricted to the areas around the immediate vicinity of the mission or presidio near the Santa Cruz River. Just as the Piman

villages were "reduced" to aggregate their populations for protection so was cattle ranching. By the time the presidios at Tubac and Tucson were established in the mid-1700s, cattle herds were already well-established in southern Arizona and basic to the subsistence of both Spanish colonists and their Indian allies, and the Apache took advantage of the cattle for their own needs through raiding.

With the implementation of a "pacification policy" that provided food and other goods to the Apaches living near the Tucson presidio, there were relatively peaceful conditions beginning in the 1780s, which lasted until Mexican Independence after 1821. During this time, Spain encouraged settlement by civilian farmers and ranchers by making large grants of land to potential settlers, and Mexico followed the same policy. Some 21 petitions for land grants were filed in southern Arizona during this time, including the San Ignacio de la Canoa Land Grant and El Sopori in the Upper Santa Cruz Valley. Together these claims totaled nearly 190,000 acres or about 300 square miles. Except for the settlements at San Xavier and Tucson, no other claims for land grants were made in the Middle Santa Cruz Valley during the Spanish and Mexican periods.

The early years of the Mexican Republic saw turmoil throughout the country. Tucson had the only significant colonial population in Arizona. Politically, it was part of the state of Sonora. The mission system, the backbone of Spanish colonial efforts was ended. The mission lands were nationalized in 1834, and largely abandoned to the Pima Indians until the American period. Apache warfare was such that by the 1840s, most Mexican ranches were abandoned and the few remaining settlers were huddled about the presidio at Tucson. Cattle ranching as an industry ended and the animals left to the wild. Early American travelers reported vast herds of wild cattle; however, by the 1850s, wild cattle were exterminated from southern Arizona due to their continuous slaughter by Apaches who preferred to eat cows rather than bulls. Cattle simply could not reproduce themselves and so died out from the landscape.

Early Territorial Ranches - With the discovery of gold in California in 1849, American explorers and miners were soon traveling west through Arizona bringing with them herds of Texas cattle. Cattle ranching in southern Arizona continued to be limited due to Apache raiding in the 1850s, but a few ranches were established after the Gadsden Purchase of 1854. Fritz and Julius Contzen established a ranch at Punta de Agua south of San Xavier in 1855, but Contzen was killed by Apaches in 1857, and continued attacks drove his brother and wife out in 1867.

After the Civil War and with increased military protection, ranching began to recover by the late 1860s. William Oury established a ranch south of Tucson, Maish and Driscoll established cattle on the Canoa Ranch. The majority of new ranches were established by Mexican-American residents, located along the Santa Cruz River between Tucson and Sahuarita. North of Tucson, a settlement of farms and small ranches known as "Nine Mile Water Hole" or "Laguna" grew up at a stage station near the confluence of the Rillito and Santa Cruz rivers.

In the eastern Tucson Basin, ranches were established along the Tanque Verde and Rillito creeks and the upper Pantano Wash near Rincon Creek. Among the ranches that were Emilio Carrillo's La Cebadilla (Tanque Verde Ranch) and Fuller's Agua Caliente Ranch. These and other small ranches supplied the growing cattle market in Tucson, at military forts, and in the booming nearby mining districts in the foothills of the surrounding mountains.

With the extreme drought of the 1890s, followed by major floods on the Santa Cruz River, which caused the downcutting of the river, farming and ranching were severely impacted and the remaining ranching efforts were tenuous at best. Environment degradation coupled with a depressed market for beef caused many of these small ranches to cease operations. As Tucson began to grow as a health resort in the 1920s, a number of ranches diversified or were converted to guest ranches to cater to the new health tourism industry that helped to drive Tucson's economy in the 20th century.

Today, with rapid urbanization and eastward expansion of the Tucson city limits, there are only very limited portions of the Tucson Basin that continue in ranching use. Ranching as a viable industry has been essentially eliminated from the Middle Santa Cruz Valley.

Land & Environmental Setting:

Confined by the Tucson Mountains on the west, the Santa Catalina Mountains on the north, the Rincon Mountain on the east, and the San Xavier District of the Tohono O'odham Nation on the south, the Tucson Basin is aptly named. The Santa Cruz River flows north through the Tucson Basin from Santa Cruz County and Mexico, and as noted earlier the river was the focal reason for its continuous settlement. Unfortunately, urbanization, depletion of the aquifer, flooding, and erosion have caused the river to deeply channelize and to cease its flow except in storm events. Also noted earlier, this loss of the river had significant impacts to the viability of ranching and farming in the Middle Santa Cruz Valley.

At present, the Tucson Valley, the urban core of the region, has an estimated population of 697,947 people, including residents of the City of Tucson and unincorporated Pima County, and the Tucson Basin covers some 361,851 acres or 565 square miles.

The Middle Santa Cruz Valley watershed reflects a significant range in elevation from 1890 to about 8000 feet. Mt. Lemmon at 9157 feet is the highest point of the Santa Catalina Mountains.

Table IV-4.1 Major Vegetation Zones in the Middle Santa Cruz Valley Watershed

▸	Agriculture/Pasture	108 acres	0.0 percent
▸	Urban	170,453	47.1
▸	Water	6	0.0
▸	Paloverde-cacti	53,063	14.7
▸	Manzanita	6,023	1.7
▸	Chaparral Scrub	114	0.0
▸	Creosote-Bursage	28,495	7.9
▸	Deciduous/Riparian	138	0.0
▸	Mixed Broadleaf	42	0.0
▸	Cottonwood/willow	515	0.1
▸	Scrub Grassland	64,205	17.7
▸	Oak/Pine/Fir	5,070	1.4
▸	Evergreen Forest	33,619	9.3
	TOTAL	361,851 acres	99.9 percent

As with much of the Basin and Range province of the greater Southwest, the rugged mountain terrain and river valley support a variety of environmental zones and vegetation types, ranging from the Santa Cruz River floodplain to higher elevation evergreen forests of the mountain ranges that surround the valley. In the Middle Santa Cruz Valley, much of the natural vegetation has been eliminated by urbanization, which represents nearly 50 percent of the basin. The only natural vegetation that remains is in the public preserves at the perimeter of the urban edge.

Because of the range in elevation, rainfall, too, is highly variable ranging from about 11 inches annually at the lowest elevations to an estimated 35 inches at the very highest elevations. Most of the rainfall in this watershed is estimated to average about 11 - 19 inches annually. This amount of rainfall covers nearly 84 percent of the subarea acreage, with most of the valley floor receiving between 11-15 inches annually.

Springs are found mostly in the Santa Catalina Mountains and upper foothills on the north side of the valley and in Saguaro National Park to the east. Some springs, like Gibbons Spring, have been incorporated in golf courses; others are now part of parks like the Pima County Agua Caliente Park. Surface water, much of it the result of impounded spring waters, covers only some 6 acres in the valley, and none is noted in the Santa Cruz River itself. It is somewhat ironic that the historic course of the Santa Cruz River whose waters once fostered Native American, Spanish, Mexican, and Anglo settlement, is now a much degraded, dry channel stripped of its cottonwoods, willows and cienegas. Not surprisingly, no areas of shallow ground water have been identified in the Santa Cruz River floodplain, but in the upper reaches of the Tanque Verde and Rillito creeks, Agua Caliente Wash, and Sabino Creek there are some 10,351 acres classified as areas of shallow groundwater. Numerous stock tanks and wells once supplemented natural water sources for cattle and wildlife use, but many have been abandoned.

Table IV-4.2 Natural & Constructed Water Sources in the Middle Santa Cruz Watershed

Springs	Intermit Major Streams	Surf. Water	Stock Tanks	Shallow Grnd-Water	Wells
42	ca. 106 mi.	6 ac	317*	10,351 acres	4,646

*It is estimated that only about 50 remain in use, primarily on the National Forest.

Land Base & Land Uses:

Nearly all of the Middle Santa Cruz Valley subarea is either within the incorporated limits of the City of Tucson, South Tucson, or unincorporated Pima County, except for the southern boundary which includes a portion of the San Xavier District. As a consequence of the urbanization of the Tucson Basin, ranching in the Middle Santa Cruz Valley is a minimal and highly threatened land use.

Largely because of the public preserves, the Middle Santa Cruz valley is also comprised of a mosaic of land ownership including federal, state, and private lands, and a significant portion of this land is privately owned. Approximate acreages are provided below for each kind of ownership.

Table IV-4.3 Land Ownership & Jurisdictions in the Middle Santa Cruz Valley

National Forest	96,642 acres	26.7 percent
BLM	125	0.0
Indian Lands	3,834	1.1
National Parks	29,330	8.1
County Parks	6,915	1.9
State Lands	19,610	5.4
Private Lands	194,655	53.8
Military	10,740	3.0
TOTAL	361,851 acres	99.9 percent

Private lands comprising some 54 percent of the land base are located in the central portion of the valley. Only 3,095 acres or less than 2 percent of these private lands are classified as used for ranching or agricultural purposes, and some 98 percent, 191,560 acres, of all private lands comprise the urban core of the City of Tucson and it s suburbs. There are a total of 3,657 subdivisions and 217,093 parcels recorded with the Pima County Assessor's Office. Platted subdivisions cover some 99,899 acres.

Ranches:

As noted earlier, much of the Middle Santa Cruz Valley was home to early Piman peoples some of whom were called Sobaipuri. At the time of Spanish contact in the 1690s and the first introduction of cattle, these Piman people were living and farming along the Santa Cruz River in dispersed river settlements. Spanish missions and settlements with herds of domestic animals were soon established at Guevavi, Calabasas, Tumacacori, Tubac, San Xavier, and at Tucson. While the Spanish Colonial government encouraged the establishment of land grants to encourage civilian settlement and ranching, no land grants were applied for in the Tucson Basin and few elsewhere were successful due to Apache hostilities. It was not until the Gadsden Purchase of 1854 that the Middle Santa Cruz Valley experienced its second significant wave of immigrants who were largely American mining prospectors; however, expanded settlement of the region did not occur until after the Civil War and the cessation of Apache raids.

With the establishment of the Southern Pacific Railroad in 1880, Tucson saw its growth and development accelerate. With the success of agriculture and ranching along the Santa Cruz River and local silver, gold and copper mines at Greaterville, near Arivaca, and elsewhere in the nearby mountains, the railroad at Tucson provided rail access to ranchers and miners who could ship cattle and ore to distant markets. This resulted in greatly increased productivity in ranching and great wealth for those ranchers who had the foresight to buy land, water, and mineral rights to expand and diversify their holdings.

The principal north-south routes in the valley, the Old Nogales Highway, Silverbell Road, and Interstate-10 and 19, follow the route of the Spanish period Camino Real that later became known as the "Tubac to Tucson Road." It was along these routes which followed the river that early ranches and farms were established in the Tucson Basin. Virtually none of these

ranches and farms survive today. Lands used in ranching now include some 3,000 acres of private lands, 4 state trust land grazing permits, and 2 National Forest leases. No BLM land is used for grazing in the Tucson Basin.

Table IV-4.4 Ranches in the Middle Santa Cruz Valley Watershed in Pima County

Ranch/Lease Name	Private Land	State Permit	BLM	National Forest Lease
Bellota*				X
De la Ossa*	X	X		
Dykman*		X		
Lopez*		X		
Redington Pass*				X

* Indicates ranches that overlap into adjacent watersheds.

The remaining Tucson Valley ranches are listed in the above table and are identified by either their ranch name or the name of the grazing lease. Please note that small ranches and horse farms comprised of only private lands are not noted; however, their use of private lands in ranching is included in the total acreage in ranch use calculated for the entire watershed.

Present data suggest that the Middle Santa Cruz Valley watershed has about 55,013 acres of ranch lands, or about 15 percent of the entire watershed. Lands not used in ranching or agriculture comprise about 85 percent of the Middle Santa Cruz Valley watershed

Of all private lands in the Middle Santa Cruz Valley totaling 194,655 acres, only 3,095 acres are used in ranching, and 191,560 acres, or about 98 percent, have other uses. Much of the state trust lands appears to be used in grazing, and the eastern portions of the National Forest lands. Forest lands used in grazing leases distinguish between "capable" range land and "incapable" range land due to rugged terrain and poor access in the higher elevations. None of the south-facing "front range"of the Catalina Mountains is used for grazing.

Table IV-4.5 Ranch lands in the Middle Santa Cruz Valley Watershed in Pima County

Land Owner	Ranch Use	Non-Ranch Use	Total
National Forest	ca. 34,000 ac	62,642	96,642 ac
State Trust Land	17,918	1,692	19,610
Indian Lands	?	3,834	3,834
BLM Lands	0	125	125
National Park	0	29,331	29,331
County Park	0	6,915	6,915
Military	0	10,740	10,740
Private Lands	3,095	191,560	194,655
TOTAL	55,013 ac	306,839 ac	361,852 ac

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 US Forest Service, 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 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 the Middle Santa Cruz Valley ranges from 4 to 9 animals per square mile depending on the terrain, location of the lease, the health of the range, rainfall, and how it is used. At the present time the various grazing leases or permits allow for a maximum of 666 animals to be grazed in the entire Middle Santa Cruz Valley watershed in Pima County.

When this number is considered together with the total acreage of 55,013 acres or 86 square miles, dedicated to ranching, the maximum average number of animals allowed to be grazed is approximately 8 animals per square mile. Grazing capacity corresponds with higher elevation and rainfall as shown on the enclosed figure. However, please note again that this number reflects only today's range conditions and lease terms. The total number of animal units is likely to be changed in the future dependent on climate, rainfall, vegetation cover, and range health.

Table IV-4.6 Animal Units Allowed to be Grazed in the Middle Santa Cruz Valley

Range of AUs Allowed	Acres/Sq.Miles in Grazing	Total AUs Allowed	Avg.AU/Sq.Mi.
4 - 9	55,013 ac. or 86 Sq.Mi.	666	7.7

In addition to grazing, federal and state public lands may be used for hunting, fishing, hiking, riding, and other recreational uses. Although these kinds of uses have not yet been fully quantified, statistics provided by the US Forest Service indicate significant numbers of visitors to Mt. Lemmon and other recreational areas.

Current Farms:

At the present time, agricultural lands are virtually non-existent in the Middle Santa Cruz Valley. Assessor records show only 222 acres classified for agricultural use today, and much of this land is probably irrigated horse pasture. Interestingly, no farm land today exists along the Santa Cruz River, and there are only a few parcels along the Rillito River and its tributaries.

Table IV-4.7 Current Farms or Irrigated Pasture in the Middle Santa Cruz Valley

Acres Ever in Agriculture	Food or Fiber Crops	Irrigated Pasture	COT parcels
?*	0? ac	222 ac	15,754 ac

* GIS data are not available

Development Pressure & Threats to Ranching:

Development pressure in the Middle Santa Cruz Valley watershed in Pima County is very high given the urbanization of the greater Tucson area, which has encompassed virtually all the land from the Tucson Mountains on the west, to the Catalina Mountains on the north, to the Rincon Mountains on the east. The only remaining open space includes the southeast quadrant where some land is still in ranching use. Much of this land is State Trust land along the I-10 corridor.

In fact, it is just those ranches and grazing permits that adjoin the urban area and I-10 corridor that are most vulnerable to development. With increasing land values in these areas and higher development potential, the State Land Department has established 5 year time limits on16 grazing permits called Special Land Use Permits (SLUPs) throughout eastern Pima County. These lands have been essentially reclassified for commercial use by the ASLD in anticipation of sale or lease of these lands for commercial or residential development. Portions of four state SLUPs for grazing occur in the Middle Santa Cruz Valley subarea. These SLUPs comprise some 17,919 acres, or 28 square miles, and represent some 5 percent of the entire watershed. These lands are located along the I-10 corridor. Under the terms of the SLUP, the rancher can be evicted in 30 days even if the 5 year permit is still current, and there will not be any reimbursements for any improvements to the land, as is customary for long-term grazing leases. Should these State SLUPs be sold or leased for development, a total of nearly 18,000 acres of State land in the Middle Santa Cruz Valley will be removed from grazing use, resulting in the virtual elimination of ranching from this watershed.

In summary, the development pressure in the urban core of Tucson in the Middle Santa Cruz Valley watershed is extremely high and likely to result in the conversion of all the remaining State Trust lands from ranching to urban development. The only lands that may continue in ranching use are the National Forest lands currently leased for grazing.

Ranch land Conservation Potential:

Assuming that the Middle Santa Cruz Valley watershed will continue to be subject to urban expansion, the overall ranch land conservation potential is lowest here in comparison to some of the other subareas of Pima County. Ranch land conservation is not likely to succeed except for the National Forest leases at the eastern end of the valley. The remaining State Trust lands will continue to be increasingly susceptible to sale for development.

Summary & Conclusions:

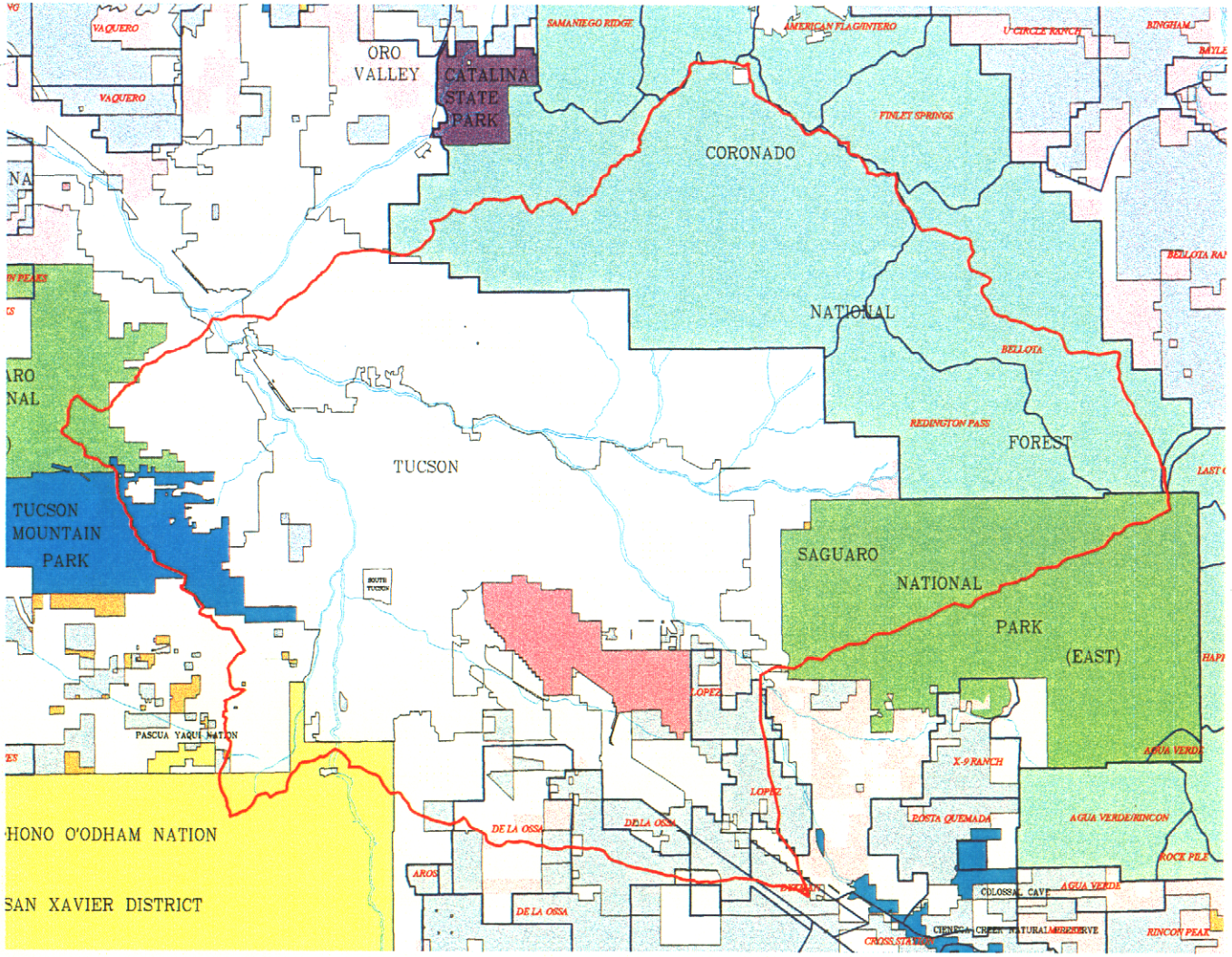
To conclude, very limited portions of the Middle Santa Cruz Valley watershed continue to support ranching operations. These include State Trust lands currently leased for grazing in the southeastern portion of the valley, and National Forest lands in the eastern portion of the valley.

Due to the ever-expanding Tucson metropolitan area, only 15 percent of the valley is used for ranching, including only 3,095 acres of private land. At the present time there is significant threat from development pressure in the remaining ranching areas of the valley, specifically the reclassification of some 18,000 acres by the State Land Department for commercial use.

Because of these significant threats of urban expansion, the Middle Santa Cruz Valley currently appears to have a very low potential for ranching to continue as a viable land use.

Ranch Lands and Grazing Allotments

SDCP PLANNING UNIT 4

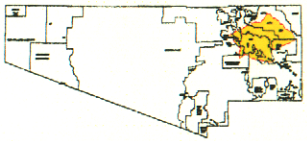


Planning Unit Boundary
Grazing Allotments
Major Washes
BLM
County Park
Indian Lands
Military Reservations
National Forest Lands
National Parks and Monuments
National Wildlife Refuge
Private Lands
State Lands
State Park
Ranch Use

STATISTICS FOR PLANNING UNIT 4

BLM	125	AC
COUNTY PARK	6,915	AC
MILITARY RESERVATIONS	10,740	AC
INDIAN LANDS	3,834	AC
NATIONAL FOREST LANDS	96,642	AC
NATIONAL PARKS AND MONUMENTS	29,331	AC
STATE LANDS	19,610	AC
STATE PARKS	0	AC
PRIVATE LANDS RANCH USE	3,095	AC
PRIVATE LANDS NON-RANCH USE	191,560	AC

Pima County Index Map



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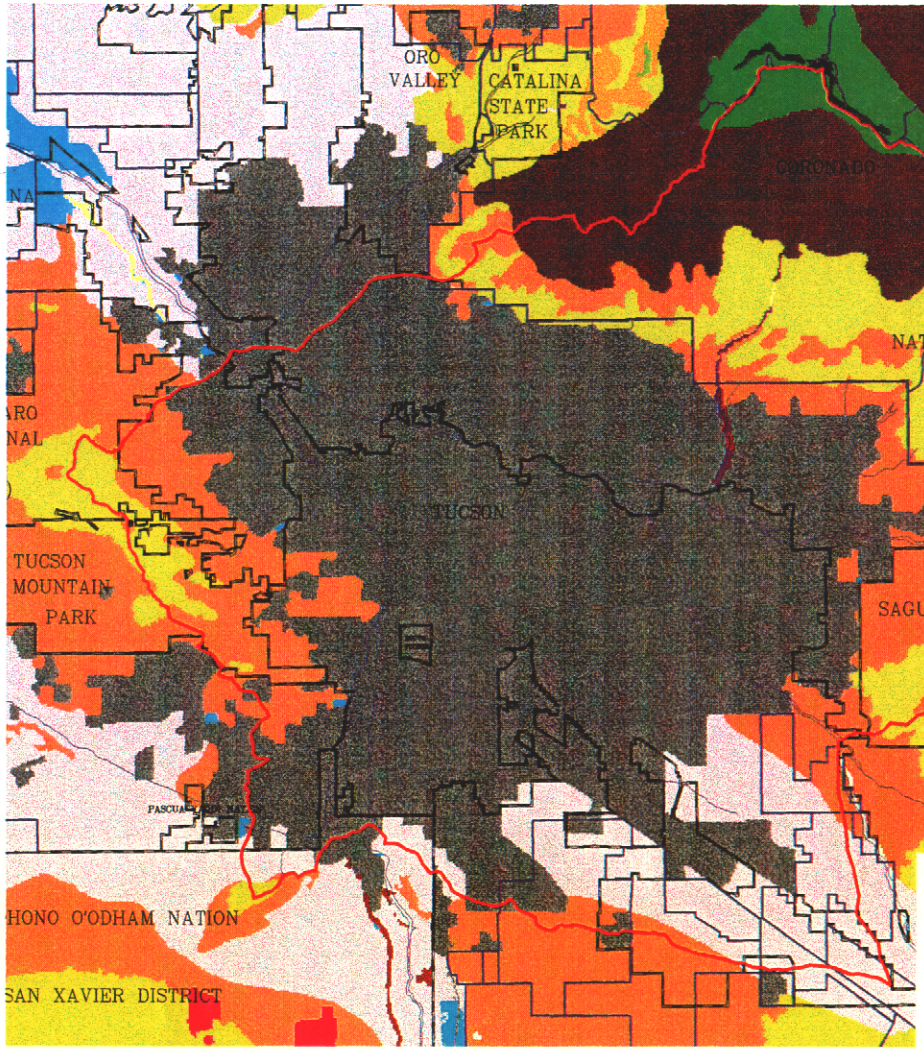
THE SEAL OF PIMA COUNTY ARIZONA

/pygmyowl2/sonora/cultural/assigned/plan4/ar.a/ranch_allot4.aml 8/23/00

GAP Vegetation and Grazing Allotments

SDCP PLANNING UNIT 4



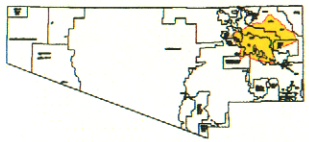
Minimum Elevation 2,198
Maximum Elevation 8,999

****
VEGETATION ACREAGE

ACRES	BIOME (SERIES)
108	Agriculture
0	Chihuahuan Desertscrub (Creosotebush--Tarbush)
0	Chihuahuan Desertscrub (Mixed Scrub)
33,619	Madrean Evergreen Forest (Encinal)
393	Madrean Evergreen Forest (Oak--Pine)
305	Madrean Montane Conifer Forest (Douglas Fir--Mixed)
4,372	Madrean Montane Conifer Forest (Pine)
0	Mining
6,023	Mogollon Chaparral Scrubland (Manzanita)
114	Mogollon Chaparral Scrubland (Mixed Evergreen)
0	Mogollon Deciduous Swampforest (Cottonwood--Willow)
42	Mogollon Deciduous Swampforest (Mixed Broadleaf)
64,205	Scrub Grassland (Mixed Grass--Scrub)
0	Scrub Grassland (Sacaton--Scrub)
138	Sonoran Deciduous Swamp and Riparian Scrub (Mixed Scrub)
28,496	Sonoran Desertscrub (Creosotebush--Bursage)
53,063	Sonoran Desertscrub (Paloverde--Mixed Cacti)
515	Sonoran Riparian and Oasis Forest (Cottonwood--Willow)
170,453	Urban
6	Water

- Watershed Planning Unit Boundary
- Grazing Allotments
- Administrative Boundaries
- Washes
- Agriculture
- Urban
- Mining
- Chihuahuan Desertscrub (Creosotebush--Tarbush)
- Chihuahuan Desertscrub (Mixed Scrub)
- Chihuahuan Desertscrub (Whitethorn)
- Madrean Evergreen Forest (Encinal)
- Madrean Evergreen Forest (Oak--Pine)
- Madrean Montane Conifer Forest (Douglas-Fir--Mixed Conifer)
- Madrean Montane Conifer Forest (Pine)
- Mogollon Chaparral Scrubland (Manzanita)
- Mogollon Chaparral Scrubland (Mixed Evergreen Sclerophyll)
- Mogollon Deciduous Swampforest (Cottonwood--Willow)
- Mogollon Deciduous Swampforest (Mixed Broadleaf)
- Playa
- Scrub Grassland (Mixed Grass--Scrub)
- Scrub Grassland (Sacaton--Scrub)
- Sonoran Deciduous Swamp and Riparian Scrub (Mixed Scrub)
- Sonoran Desertscrub (Creosotebush--Bursage)
- Sonoran Desertscrub (Paloverde--Mixed Cacti)
- Sonoran Desertscrub (Saltbush)
- Sonoran Interior Marshland (Cattail)
- Sonoran Riparian and Oasis Forest (Cottonwood--Willow)
- Unclassified/Mixed
- Water

Pima County Index Map



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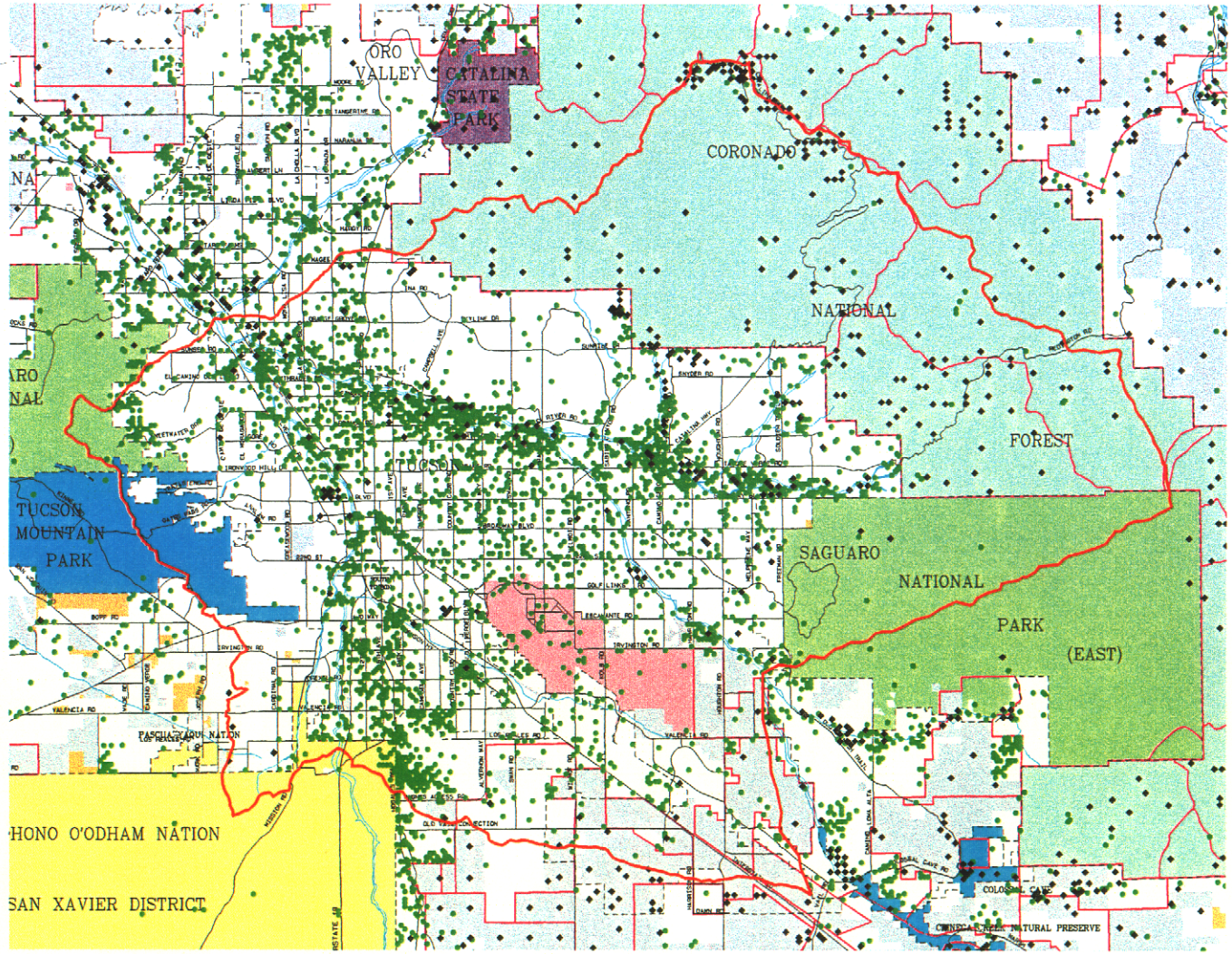
/pvgmvow12/sonora/cultural/esmjpimad/plan4/covers/ranch_gap4.aml 5/23/00

Stock Tanks and Well Sites



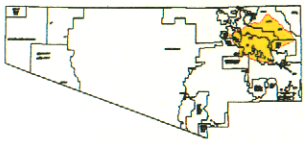
SDCP PLANNING UNIT 4

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

STATISTICS FOR UNIT 4

Well Sites:	4,646
Stock Tanks:	317

Pima County Index Map



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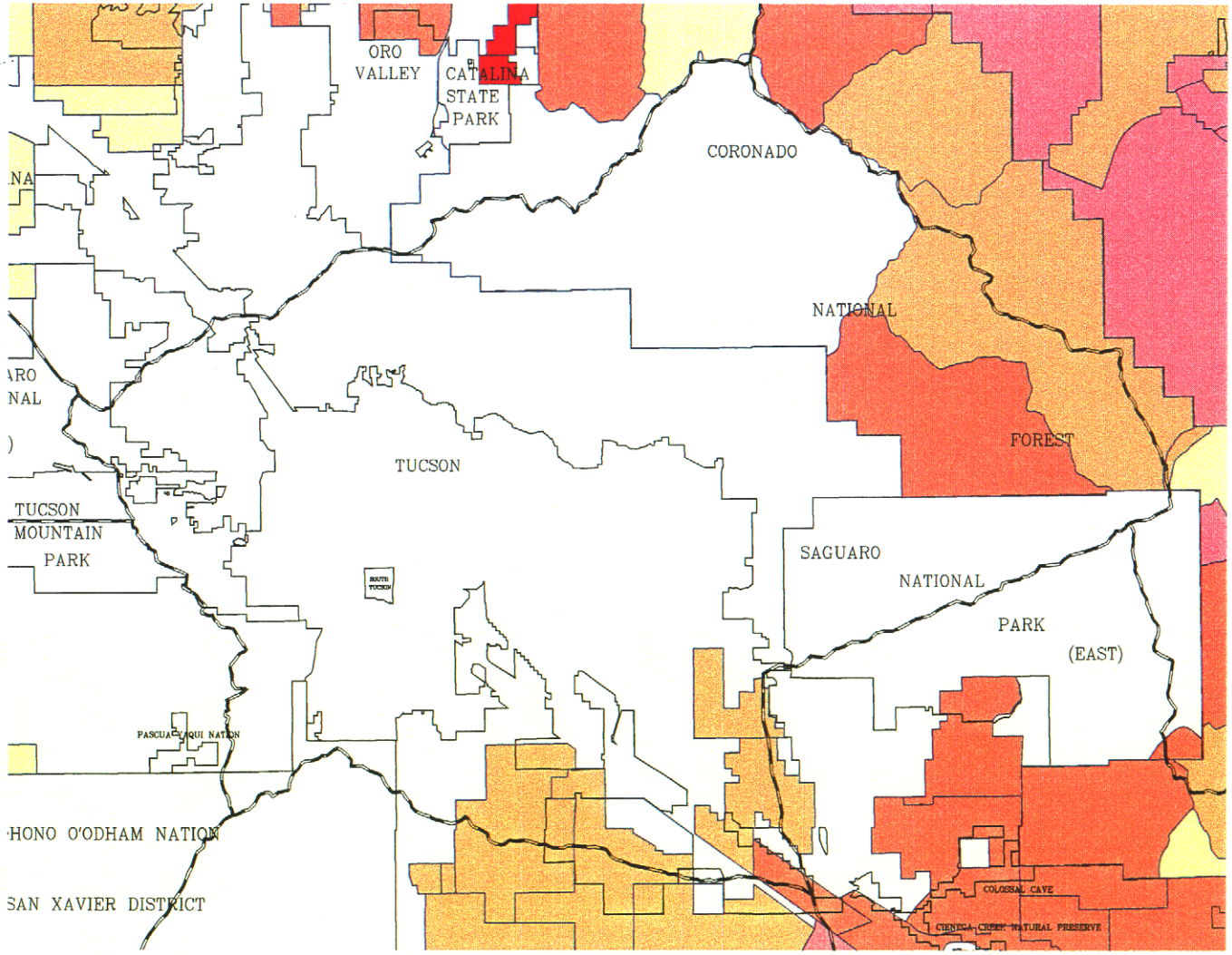
/pydmvol2/sonora/cultural/asmjoined/plan4/amls/ranch_tank4.aml 5/24/00

Carrying Capacity per Square Mile by Grazing Allotment

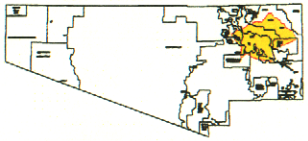
SDCP PLANNING UNIT 4



- 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

Pima County Index Map



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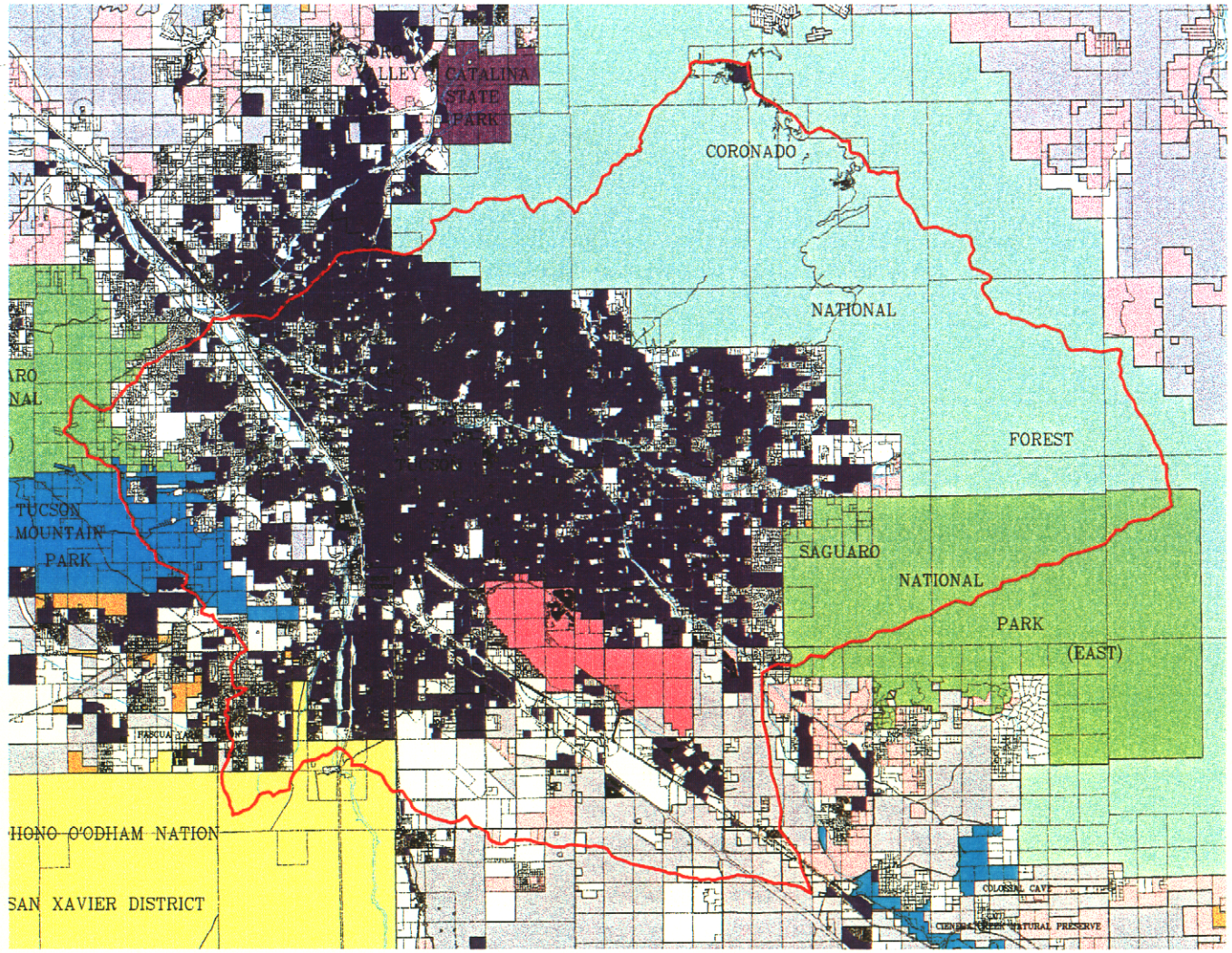
/pygmyowl2/sonora/cultural/asmjoined/plan4/amls/ranch_lines 4.3/24/00

Platted Subdivisions



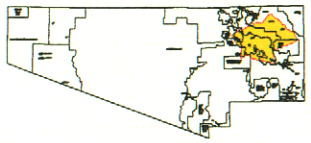
SDCP PLANNING UNIT 4

- 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

STATISTICS FOR UNIT 4

NUMBER OF PLATTED SUBDIVISIONS:	3,657
ACRES OF PLATTED SUBDIVISIONS:	99,899
NUMBER OF PARCELS:	217,093

Pima County Index Map



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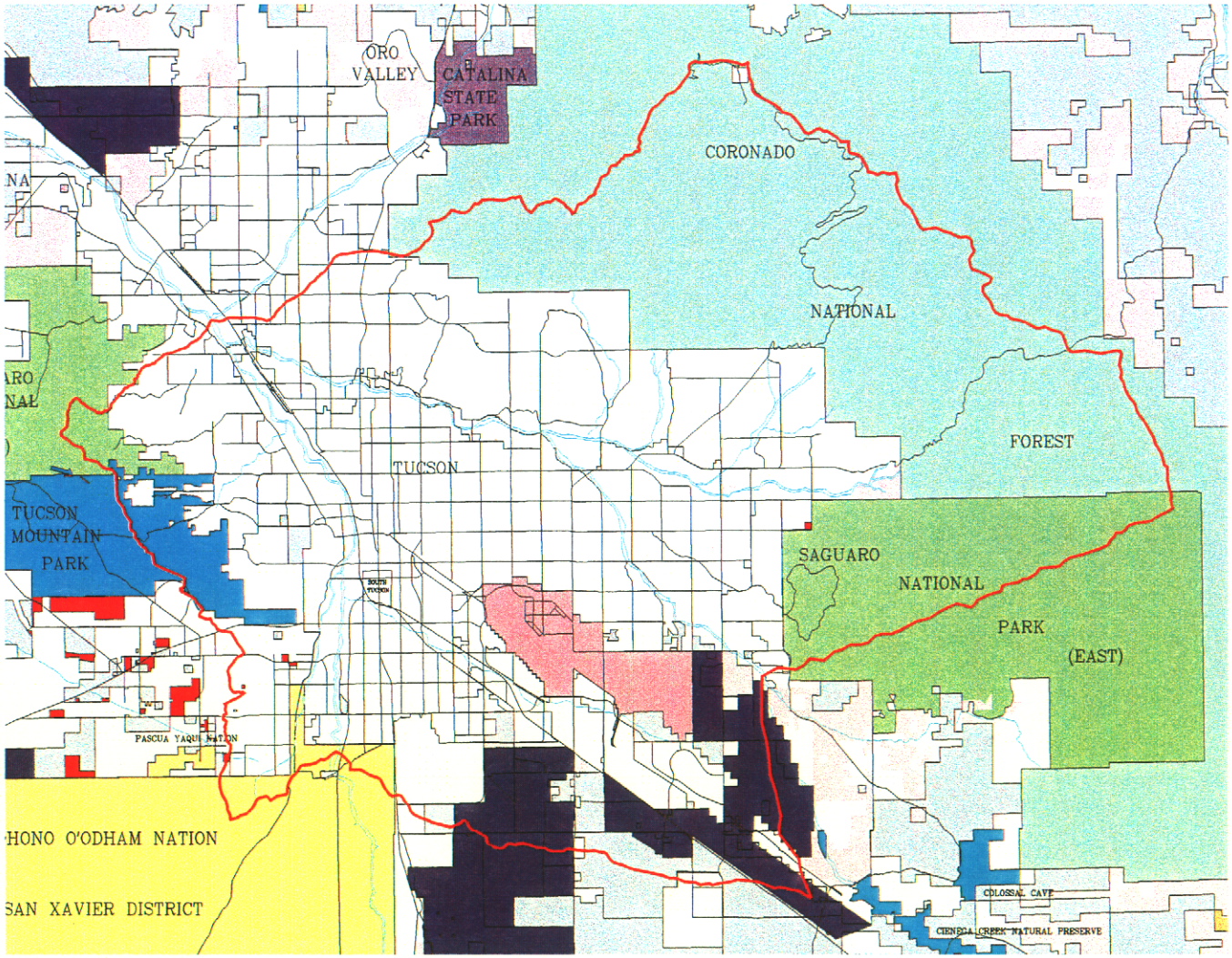
/pydmyowl2/sonora/cultural/asajoined/plan4/ams/ranch_sub4.aml 6/1/00

Disposable Lands for BLM and State of Arizona



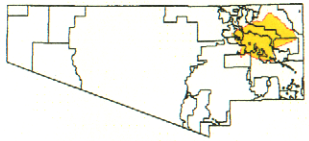
SDCP PLANNING UNIT 4

- Planning Unit Boundary
- Major Washes
- Disposable BLM Land
- Disposable State Land
- 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

STATISTICS FOR UNIT 4

DISPOSABLE BLM LAND: 125 AC.
DISPOSABLE STATE LAND: 17,919 AC.

Pima County Index Map



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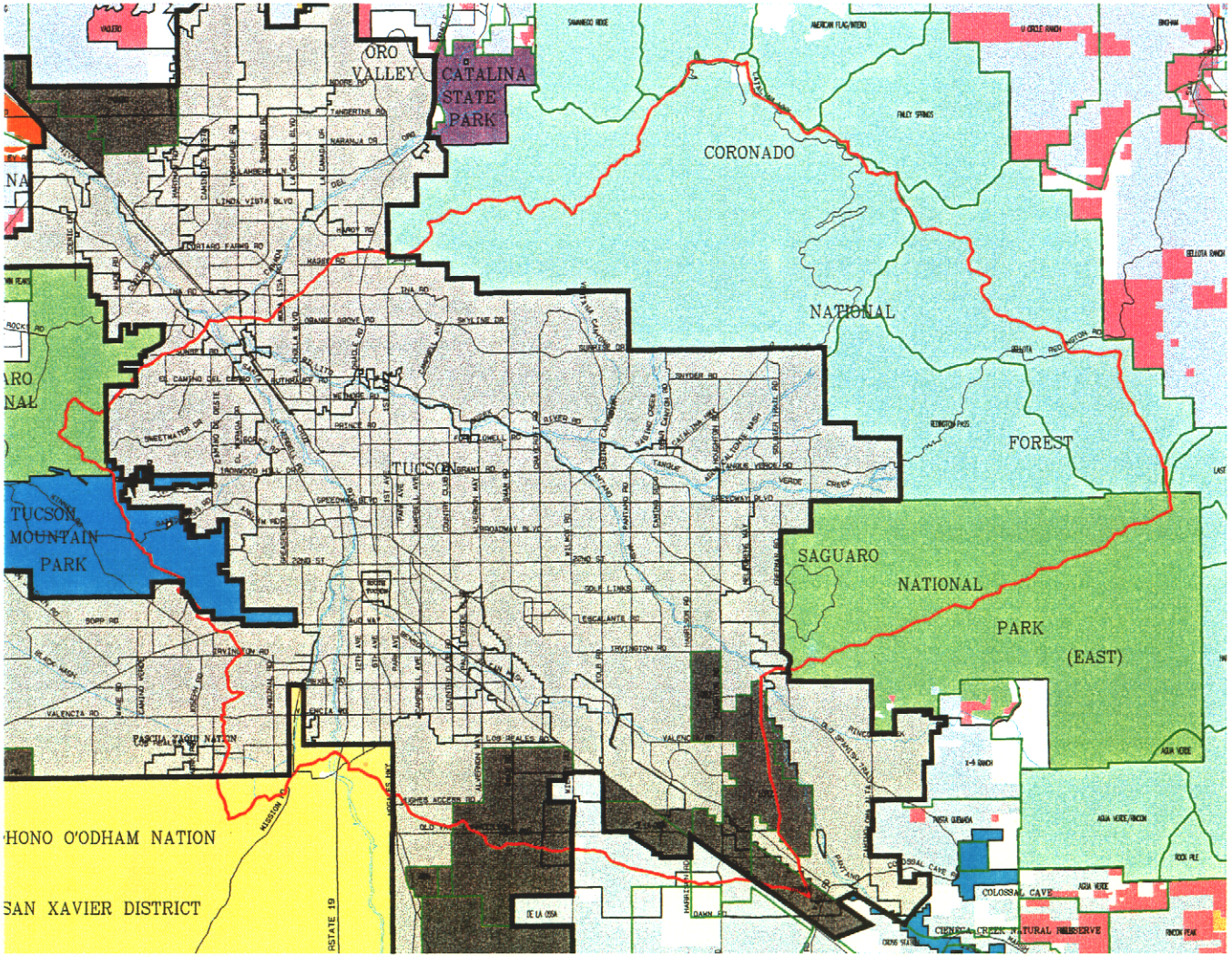
pygmyowl2/sonora/cultural/esajoined/plan4/amls/ranch_disp4.aml 5/23/00

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



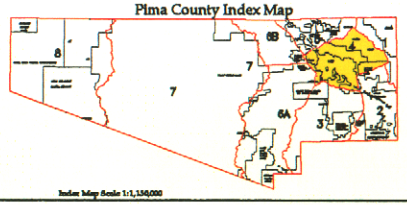
SDCP PLANNING UNIT 4

- 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 LANDS
- STATE PARK
- RANCH USE
- AGRICULTURAL USE
- Urban Boundary
- ASLD / SLUP's

STATISTICS FOR UNIT 4

ACRES OF ASLD/SLUP's 17,919

Pima County Index Map



Index Map Scale 1:1,150,000

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/pydsvr012/sonora/cultural/esnjoined/plan4/amls/ranch_urban4.amPlotted: 5/24/00

IV-5. Ranching in the Tortolita Fan

Introduction:

The Tortolita Fan, located to the northwest of Tucson metropolitan area, is formed by the bajada slopes of the Tortolita Mountains to the north and further defined by two major streams, the Santa Cruz River and the Canada del Oro Wash. The Tortolita Fan adjoins the Avra Valley to the west and is separated from the Avra Valley by a low ridgeline between the Santa Cruz River and Los Robles Wash. In the western portion of the Tortolita Fan, the Santa Cruz River flows north to the Pinal County line. To the east the Tortolita Fan adjoins the Middle Santa Cruz Valley and the San Pedro Valley, both of which are defined by the ridgelines of the Santa Catalina Mountains. Along its eastern edge, the Canada del Oro Wash flows southwest to its confluence with the Santa Cruz River.

The eastern portion of the Tortolita Fan comprises the incorporated town of Oro Valley, which is rapidly being subdivided and defines the urbanizing edge of the Tucson metropolitan area. The western portion of the Tortolita Fan comprises a portion of the incorporated town of Marana. Portions of Marana remain rural and in agricultural use, and other areas, such as "Dove Mountain" are being subdivided and developed. The southerly and eastern portions of the Fan area are either urbanizing or in intensive agricultural use as croplands. The remaining expanses of natural open space are located in the northern and western portions of the Fan, and are comprised principally of State Trust lands, and in Catalina State Park and the Coronado National Forest.

Historical Background:

It is possible that the initial occupation of the Tucson Basin dates to the prehistoric Paleoindian period perhaps as early as 10,000 B.C., but no sites of this age have been recorded in the Tortolita Fan area. Whether Paleoindian people actually occupied the Tortolita Fan is not known, but it seems likely that these early hunters could have pursued big game animals in the region.

With the extinction of the large Pleistocene mammals, 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 occupied villages and smaller hamlets from about A.D. 300 to 1450 along the Santa Cruz River and Canada del Oro floodplains. Some of the principal Hohokam villages here include the Marana Community, Honey Bee Village, the Badger Hole Ranch Site, and the Romero Ruin, all located along major streams. In addition, extensive areas of "dry-farming" fields, exhibiting rock piles, check dams ,and bordered gardens have been documented on the western face of the Tortolita Fan in non-riverine areas. In the foothills of the adjacent mountains, there are numerous rock art

sites and smaller, perhaps seasonal campsites that were repeatedly occupied for gathering and processing of wild plant foods. 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 1690s and encountered Piman peoples who are likely to be the descendants of the Hohokam. The region was known during Spanish Colonial and Mexican periods as "Pimeria Alta." Arriving about the same time as the Spanish, the Apache, too, frequented this region to search for seasonally available foods and often to raid O'odham settlements for their stores of cultivated foods.

With the acquisition of this region by the United States following the 1854 Gadsden Purchase, and the military presence after 1870, some of the first Americans to enter the area were prospective miners in search of gold and silver. Mining sites are known in the surrounding mountain ranges, including the lost and legendary "Iron Door Mine" located somewhere along the Canada del Oro in the Santa Catalina Mountains. Other legends like the "the Lost Mission of Ciru" focused on tales of buried Spanish gold. Ranching here did not begin in earnest until the 1870s because of the threat of Apache raiding. Despite living in a fortified compound on a hilltop above the Sutherland Wash, even the pioneer rancher Francisco Romero discussed below found he could not endure the constant raiding, and in 1870 moved to Tucson.

Today, the Fan's principal residential and commercial areas are relatively recent and include Marana, Oro Valley, the proposed towns of Casa Adobes and Tortolita, and Catalina. Portions of the area continue in ranching and agricultural use, while experiencing significant growth and urbanization. One of the smaller Pima County subareas, the Tortolita Fan is comprised of approximately 203,546 acres (ca. 318 square miles).

Land & Environmental Setting:

Located to the northwest of the urban Tucson Basin, the Tortolita Fan is defined by the Santa Cruz River and the Canada del Oro Wash, and the natural divides formed by the Santa Catalina Mountains, the Tucson Mountains, and a ridge between the Los Robles Wash and the Santa Cruz River. Unlike the urbanized Tucson area or the largely rural Altar Valley, the Tortolita Fan area is split -- agricultural and undeveloped in its western and northern reaches and urbanizing to the east and south. Suburban areas are a mix of platted subdivisions and lot-split subdivisions. These developing areas occur within Oro Valley and Marana and along the I-10 corridor and along Oracle Road.

The Tortolita Fan is bounded by the City of Tucson urban area on the south, the Catalina Mountains on the east, the Pinal County line on the north, and the Avra Valley and Tucson Mountains on the west. The Tortolita Fan watershed reflects a range in elevation from 1889 to 8,998 feet. Except for the high elevations of the Catalina Mountains, the Tortolita Fan is one of the lower elevation subareas in eastern Pima County.

As with much of the Basin and Range province of the greater Southwest, the rugged mountain terrain and river valleys support a variety of environmental zones and vegetation types, ranging from the Santa Cruz River and Canada del Oro floodplains to the higher

elevation mountain ranges that define the subarea. The foothills of the Catalina and Tortolita Mountains are the only upland areas where grasslands occur. Much of the subarea is characterized by Sonoran desert scrub creosote, bursage, paloverde, and ironwood.

Table IV-5.1 Major Vegetation Zones in the Tortolita Fan Watershed in Pima County

▸ Agriculture	22,341* acres	11.0 percent
▸ Urban	30,848	15.2
▸ Mining	700	0.0
▸ Water surface	10	0.0
▸ Cottonwood-Willow	12	0.0
▸ Paloverde Scrub	28,032	13.8
▸ Creosote-Bursage	67,227	33.0
▸ Scrub Grassland	21,852	10.7
▸ Mixed Evergreen	4,764	2.3
▸ Manzanita	400	0.0
▸ Pine Forest	4,534	2.2
▸ Douglas Fir	345	0.0
▸ Evergreen Forest	21,109	10.4
▸ Mixed Broadleaf	1,372	0.7
TOTAL	203,548 acres	99.3 percent

*Assessor records indicate only 13,821 currently in agricultural production.

Because of the predominantly lower elevation of the Tortolita Fan, rainfall is generally lower here than other valleys. However, because of the greater range in elevation, rainfall also has a greater range from an estimated 9 inches annually at the lowest elevations to an estimated 37 inches at the highest mountain uplands. Most of the rainfall in this watershed is estimated to average about 9-17 inches annually, and covers nearly 82 percent of the subarea acreage. Water is very limited in this lower elevation subarea. There are only 12 natural springs identified in the Catalina Mountains, with no springs on the fan itself or in the Tortolita Mountains. The Santa Cruz River and Canada del Oro washes and their tributaries run for some 42 miles through the valley. Shallow ground water has been identified in the upper reaches of the Sutherland Wash. Historically, numerous stock tanks and wells have been constructed to provide water sources for livestock and domestic use. About 223 stock tanks and a total of 1401 wells are recorded with the Arizona Department of Water Resources. Approximately 900 wells may be currently in use as domestic sources of water.

Table IV-5.2 Natural & Constructed Water Sources in the Tortolita Fan Watershed

Springs	Intermit-Streams	Stock Tanks	Shallow Grnd-Water	Wells
12	ca. 42 mi.	223*	483 acres	1401

* GIS data suggest only 64 stock tanks remain in use today.

Despite its lower elevation and limited surface water sources, stock tanks and wells located principally on State lands allow ranching in the northern and western reaches of the Tortolita Fan to continue.

Land Base & Land Uses:

The Tortolita Fan is comprised of the incorporated towns of Oro Valley (17,906 acres), Marana (43,115 acres), and the balance is unincorporated Pima County. Like much of Pima County, the Tortolita Fan is comprised of a mosaic of land ownership including federal, state, and private lands. The only significant areas of natural open space that remain are State Trust, Forest, and BLM grazing lands, with some parcels of private land still in ranching use in the northern portion of the subarea. Approximate acreages are provided below for each kind of ownership.

Table IV-5.3 Land Ownership & Jurisdictions in the Tortolita Fan

BLM	1,183 acres	0.5 percent
State Lands	44,706	22.0
Private Lands	102,681	50.4
National Parks	8,501	4.2
County Park	3,124	1.5
State Park	5,471	2.7
National Forest	37,799	18.6
Military	40	0.0
Unknown	41	0.0
TOTAL	203,546 acres	99.9 percent

Marana, Oro Valley, Catalina, and subdivided lands north of the Tucson metropolitan area are the principal urbanizing areas in the Tortolita Fan area, and the total population is currently estimated at 65,238 people. Private lands, comprising some 50.4 percent of the land base, are located principally in the southeastern and western portions of the Tortolita Fan along the Santa Cruz River floodplain and I-10 corridor, while public lands are predominant in the northern and far-western portions. Only some 18 percent of these private lands, or 18,606 acres, are classified as used for ranching or agricultural purposes, some 82 percent of all private lands, or 84,075 acres, are categorized as non-agricultural lands.

A significant area of these non-ranching private lands characterizes much of the eastern, southeastern, and central portions of the subarea. These areas, which include Oro Valley and a portion of Marana, essentially mark where the transition from ranching and agricultural land use to residential development is occurring.

While there may have been as many as 22,343 acres along the Santa Cruz and Canada del Oro floodplains used historically for food and fiber crops, today there are only 13,821 acres still in cultivation, a reduction of more than 60 percent. More than 1,500 acres of agricultural

land have been purchased by the City of Tucson for water rights and are currently vacant, but most of these former agricultural lands are platted subdivisions or lot-split subdivision areas. Elsewhere in the Tortolita Fan, clusters of private lands that are not used for ranching are found in the vicinity of the Twin Buttes mine, in Catalina, and in the central portion of the fan between Marana and Oro Valley town limits. Throughout the Tortolita Fan, there are 602 platted subdivisions comprised of 19,649 acres; however, there are approximately 48,863 separate parcels recorded with the Pima County Assessor's Office.

Ranches:

As noted earlier, much of the Tortolita Fan was part of the homeland of the Piman-speaking Tohono O'odham. Although initially explored by Spanish missionaries including Fr. Kino, no Spanish missions or settlements were established here. Instead, Spanish settlement focused on the Piman communities in the Middle Santa Cruz valley where permanent water was available and where the Tucson Presidio afforded some protection. However, most of the region remained uninhabited from about 1750 to the 1870s because of Apache raiding. After, the Gadsden Purchase of 1854, southern Arizona experienced its first significant wave of immigrants who were largely American mining prospectors in search of gold and silver.

With the establishment of transcontinental mail routes and local mines in the Tucson and Catalina mountains, a number of freight and stagecoach lines were created that followed the old Spanish Colonial route that went north to the Gila River or east to the San Pedro River. On the east side of the Santa Cruz the route to Fort Grant and the San Pedro River followed the Canada del Oro drainage and went to the north of the Catalina Mountains to Oracle. These original freight and stage line roads that opened the region to settlement and homesteading remain the principal routes of access today -- the I-10 corridor and Oracle Road.

While stage lines and freighting and some mining occurred on the Tortolita Fan, only a few brave pioneers attempted to establish ranches in the area in the mid-1800s because of Apache raiding and the lack of permanent water. One of the most notable ranching pioneers was Francisco Romero and his wife Victoriana, who established perhaps the very earliest ranch to the north of Tucson in 1844, which was then Apache territory. With 30 head of cattle, they staked a claim of 160 acres in the Canada del Oro Valley, along a major raiding and travel route of the Pinal Apaches. To protect his family and livestock, Romero reconstructed a stone compound wall on a Hohokam ruin located at the confluence of Canada del Oro and the Sutherland Wash known as "Pueblo Viejo." In 1870, the Romero family was finally forced out of their fortified Canada del Oro ranch after his entire stock of cattle, horses, and mules was lost in less than one year. The Romero Ranch remained abandoned until 1889 when their son Fabian Romero returned, built a new ranch house, and proceeded to expand the Romero Ranch to about 4800 acres.

As the population of Arizona Territory grew after the Civil War, settlers asked the federal government for military protection. An 1871 Tucson petition to the President of the United States listed 301 people killed in southern Arizona by Apaches in a seven year period, and it is estimated this was about ten percent of the Anglo-American population of Arizona at that

time. The government responded by establishing more forts such as Fort Bowie and Fort Lowell, which created a greater demand for beef, grain, and produce, and farmers and ranchers met the increased demand by cultivating more land and by expanding their cattle herds.

It was perhaps as early as 1870 that Frank Treat established his "Terrible Cattle Company" in the Tortolita Mountains. Another early rancher in the area was George Pusch who established a ranch together with John Zellweger along the route to Fort Grant in 1874. They installed the first steam pump well in the territory, and it eventually became known as the Steam Pump Ranch, a frequent stop for travelers. Pusch also built a ranch house and stone corrals in upper Honey Bee Canyon shown as Pusch's Ranch. Pusch Ridge is also named for this early settler.

Also in the Canada del Oro Valley, William Henry Sutherland began ranching in 1893, which gave rise to the name of Sutherland Wash named after this ranching family. Sometime before 1940, the Fuller and McAyers families purchased 4100 acres of these other Canada del Oro ranches, which became known later as Rancho Romero, and today includes the site of Catalina State Park.

Some notable early ranches in the Santa Cruz Valley include the Francisco Ruelas Ranch located at the old Point of the Mountain Butterfield Stage Station, and the 1878 Borjorquez Ranch located to the south near what is today the intersection of Silverbell Road and Cortaro Farms Road.

Today, despite significant development in the Tortolita Fan area, some nine ranches continue in operation in this subarea, utilizing private lands, 10 State Trust Land grazing leases, 2 Forest Service leases, 2 BLM leases, and 2 State Special Land Use Permits.

These ranches are listed in the following table and are identified by either their ranch name or the name of the grazing lease. Please note that relatively small ranches comprised of only private lands are not noted by name below; however, their use of private lands in ranching is included in the total acreage in ranch use calculated for the entire watershed.

Table IV-5.4 Ranches in the Tortolita Fan Watershed in Pima County

Ranch/Lease Name	Private Land	State Lease	BLM	National Forest Lease
U Circle Ranch*				X
BKW*	X	X	X	
Catalina South		X		
Rail X Ranch	X	X	X	
Vaquero	X	X		
Wong		X		
Smyth		X		
Post	X	X		
Twin Peaks*		X		

* Indicates ranches that extend into adjacent watersheds

These larger ranches, which include both cow-calf and steer types of livestock operations, all utilize grazing and ranch management plans under which they implement their state and federal grazing leases.

Despite some continued grazing leases, significant portions of the Tortolita Fan are not used for ranching or agricultural uses. Unlike many of the other rural subareas, the Tortolita Fan watershed is rapidly developing, and private lands comprise the largest percentage of land in the Tortolita Fan at about 50 percent. Also unlike many of the other subareas, only about 40 percent of the area is comprised of ranch or agricultural lands. As is typical, most of these lands are public lands used for grazing. Lands not used in ranching or agriculture comprise some 119,000 acres or about 60 percent of the Tortolita Fan watershed. As noted elsewhere, much of the non ranch lands comprise the Town sites of Oro Valley, Marana, platted and wildcat subdivision areas, Saguaro National Park, and Catalina State.

Table IV-5.5 Agricultural and Non-Agricultural Lands in the Tortolita Fan in Pima County

Land Owner	Ranch/Ag. Use	Non-Ranch/Ag.Use	Total
State Trust Land	42,306	2,400	44,706
BLM Lands	1,183	0	1,183
National Forest	22,700	15,099	37,799
Saguaro National Park	0	8,501	8,501
Tucson Mt. Park	0	3,124	3,124
State Park	0	5,471	5,471
Military	0	40	40
Private Owners	18,606*	84,075	102,681
Unclassified		41?	41
TOTAL	84,795 ac	118,751 ac	203,546 ac

* Approximately 13,821 acres are croplands and 4,785 acres are used in ranching.

Of all private lands in the Tortolita Fan totaling 102,681 acres, approximately 4,785 acres are used in ranching, 13,821 acres are used as croplands, and the balance of about 82 percent, have been developed or have other uses. It should be noted that 1549 acres of former agricultural land owned by the City of Tucson are included in this total of non-agricultural lands. A total of 44,706 acres of State Trust lands appear to be used in grazing and much of the BLM lands only totaling 1,183 acres. There are about 22,700 acres of National Forest lands in the Tortolita Fan used for grazing.

Ranch improvements that have been made include ranch headquarters, residences, stables, corrals, irrigated pasture, fencing for lease boundaries and pasture rotation, roads and fire breaks, erosion control, and development of stock tanks and wells as water resources for cattle and wildlife. Most of these improvements have not been quantified for this report, but water sources that are critical to the success of ranching and for maintaining wildlife have been researched. It has been noted in the above table that natural water sources are virtually

non-existent in the Tortolita Fan, and only 12 springs are noted in the Santa Catalina Mountains. To provide adequate water sources, approximately 223 stock tanks have been constructed over time, but only 64 appear to remain in use due to urbanization.

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 Forest Service, 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 the Tortolita Fan watershed ranges generally from 1 to 9 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. Only one State grazing permit allows 16 animals per square mile.

At the present time, the various grazing leases allow for a maximum of 679 animals to be grazed in the entire Tortolita Fan watershed in Pima County. When this number is considered together with the total acreage of 84,795 acres or 132 square miles, dedicated to ranching and agriculture, the maximum average number of animals allowed to be grazed is approximately 5 animals per square mile.

Grazing capacity in the Tortolita Fan is relatively 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 beans, cholla buds, prickly pear cactus, and crop stubble provide seasonally available forage for livestock in the lower elevation environment of the Tortolita Fan. Portions of the Tortolita and Catalina mountains provide a grasslands environment that is typical of the higher elevation valleys.

Table IV-5.6 Animal Units Allowed to be Grazed in the Tortolita Fan in Pima County

Range of AUs Allowed	Acres/Sq.Miles in Grazing	Total AUs Allowed	Avg.AU/Sq.Mi.
1 - 9*	84,795 ac. or 132 Sq.Mi.	679	5.1

* One State lease allows 16 AUs.

In addition to grazing, federal and state public lands may be used for hunting, fishing, hiking, riding, and other recreational uses. Recreational use of Catalina State Park and other public lands in the Tortolita Fan watershed is very high due to its close proximity to the Tucson metropolitan area and its easy access. Data provided by Catalina State Park indicate that between 145,000 to 155,000 paid visitors used the park in 1999. If unpaid visitors are considered, park personnel estimate there may be as many as 185,000 people who use the park annually.

Current Farms:

At the present time, there are considerably fewer areas where food or fiber crops are being commercially grown in the Tortolita Fan watershed when compared to earlier efforts of agricultural production. Cotton became particularly important to Arizona's economy during and after World War I, when significant acreage in the lower Santa Cruz floodplain in the Marana area and the Tortolita Fan areas came under cultivation. This area on the west side of the subarea near the confluence of Los Robles Wash and the lower Santa Cruz River was ideally suited for agriculture. Marana, "tangle" in Spanish, was known historically for its thick stand of mesquite and desert growth in this area, and later after the coming of the railroad, it became a "flag station" in 1890, known as Marana.

While a few homesteaders and ranchers settled in the area, agriculture was very limited until the extensive "Post Farms" project began in 1920, using irrigation pumps and extensive canal networks to irrigate cultivated fields of cotton and other seasonal crops. The settlement and extensive field systems became known as Postvale, distinct from the railroad stop of Marana. A post office for Postvale was established in 1920, but later consolidated with Marana in 1925, when the name reverted to Marana.

Today, available GIS data indicate there are some 13,821 acres of land currently irrigated for crops and pasture in the Tortolita Fan. However, there are nearly 22,343 acres of the Tortolita Fan that were once under cultivation, and much of this land is considered "prime farmland" by the US Department of Agriculture (USDA). Prime farmland is one of several kinds of important farmland defined by the USDA, considered to be of major importance in meeting the nation's short and long-term needs for food and fiber. Because the supply of high-quality farmland is limited, the USDA encourages the "wise use" of our nation's farmland, and has mapped these areas based on deep, loamy soils, an adequate and dependable supply of water for irrigation, little slope, soils that are not conducive to erosion, and sufficient growing season. Consequently, with the right combination of soil qualities, growing season, and moisture supply, prime farmland produces the highest yields with minimal expenditure of energy and economic resources, and farming it results in the least damage to the environment.

In all of eastern Pima County in the area surveyed by the USDA, a considerable portion of the prime irrigated farmland acreage occurs in the Marana area of the Tortolita Fan along the Santa Cruz River floodplain. Within the Tortolita Fan, there are more than 21,000 acres designated as prime farmland, and much of this includes areas once under cultivation as well as the remaining cultivated lands. These prime farmlands tend to occur both to the east and west of the Santa Cruz River floodplain. In the southern area of the Tortolita Fan, much of

this prime farmland has been developed into suburban residential areas. Today, the principal area of remaining prime farmlands is located between I-10 on the east and the Santa Cruz River channel on the west where a variety of crops are grown. Future conversion of these prime agricultural lands to residential and commercial development may now be possible due to recent flood control improvements on the east side of the river.

The City of Tucson currently owns 53 parcels of land comprising a total of some 1,549 acres that were purchased for their water rights. These areas that were once irrigated farmland tend to be located in the western portion of the Tortolita Fan. Approximate acreages for current and historically irrigated agricultural lands are provided below.

Table IV-5.7 Current Farms or Irrigated Pasture in the Tortolita Fan Watershed in Pima County

Acres Ever in Agriculture	Current Croplands	COT Parcels	Developed/Vacant Farmland
22,343 acres	13,821	1,549	6,973

Development Pressure & Threats to Ranching:

Development pressure in the Tortolita Fan watershed in Pima County is significant due to the rapid development in Oro Valley and Marana and along the major transportation corridors. Its proximity to the urbanizing Tucson area and its road and services infrastructure creates an incentive for development due to rising real estate values. As noted above, growth and urbanization is occurring in the southern and eastern portions of this watershed. Here, ranching and agriculture are no longer viable, and the transition of agricultural lands to real estate is increasing along the I-10 corridor from south to north. In fact, there are only a few small state grazing leases in the area, and the "urban boundary" here may be defined by the boundary of the remaining ranches to the north and west that utilize both private land and public land grazing leases in their operations. Moreover, due to its proximity to the Tucson metropolitan area and the Oro Valley and Marana Town sites, there is an increasing and high probability that additional private lands and State Trust lands in the Tortolita Fan will be sold for development.

Using contiguous ranch lands and grazing leases to define natural open space and define the urban boundary, nearly one-third of the Tortolita Fan may be considered to be urbanizing. Should development intensify in this subarea, Saguaro National Park, the Tortolita Mountains, and Catalina will become surrounded by urbanizing metropolitan area.

At the present time, there are 602 platted subdivisions comprising some 19,649 acres in the entire Tortolita Fan watershed in Pima County, and there are approximately 48,863 recorded parcels of land. Approximately 30,848 acres have been characterized by GIS vegetation analysis as urbanized area in the Tortolita Fan.

Areas of ranch land fragmentation may be defined as those parcels that are not used in ranching and that have been subdivided or have the potential to be subdivided.

Approximately 84,000 acres of private lands are currently not used in ranching or agriculture and may be developed. When reviewed on a map, these areas of non-ranch private land holdings cluster in the urbanizing southern and eastern portions of the watershed near Marana, Oro Valley, in the Catalina area, near Saguaro National Park, and near the I-10 corridor. Only the northern and western portions of the Tortolita Fan along the Pinal County line remain as largely unfragmented ranch lands and natural open space.

At the present time, large areas committed for planned development include Dove Mountain in Marana and Rancho Vistoso in Oro Valley, and portions of these planned development areas may be considered "rent-a-cow" operations where ranch land designation by the Assessor's Office is used to lower property taxes while waiting for the opportune time to develop.

In addition to private lands being converted for development, the Arizona State Land Department (ASLD) has identified two Special Land Use Permits (SLUP) located in the area between Interstate 10 and the CAP canal. This area comprises some 11,000 acres of State land and adjacent private lands. These SLUPs are currently 5-year grazing permits on lands that have been classified by ASLD for commercial use. Although a 5 year permit, the permit can be canceled at any time by the ASLD. Because of their location along I-10, there is a reasonably high probability that the ASLD parcels identified for commercial use will be developed. There are currently no BLM lands identified for sale, lease, or exchange.

In summary, the development pressure in the Tortolita Fan watershed in Pima County is significant at the current time and splits the subarea from south to north. In the eastern and southern portions of the Tortolita Fan, development pressure is very high due to the predominance of private land and expanding urbanization in the incorporated areas. To the west and north, much of the landscape remains as natural open space due to the predominance of public grazing lands.

The principal threat to the stability of ranching and agriculture in the Tortolita Fan is likely to be due in the future to the continued transition of private ranch lands and agricultural lands and State grazing leases to real estate development. While a land value analysis has not been completed, land values appear to be increasing significantly so that much of the private land on the Tortolita Fan is likely to be sold for development rather than retained for agricultural or ranching use.

Ranch Land Conservation Potential:

While the natural open space of ranch lands would further enhance the protection of the existing park preserves and National Forest lands, it appears that ranching and ranch land conservation is threatened in this subarea due to significant development pressure. Agricultural lands along the Santa Cruz River will also become increasingly susceptible to development once removed from "flood-prone" status. Available information suggests that the potential for ranch land conservation is possible only in the western portions of the Tortolita Fan and in some areas of the National Forest. Other portions of the Tortolita Fan, however, will continue to be susceptible to fragmentation and development as discussed above.

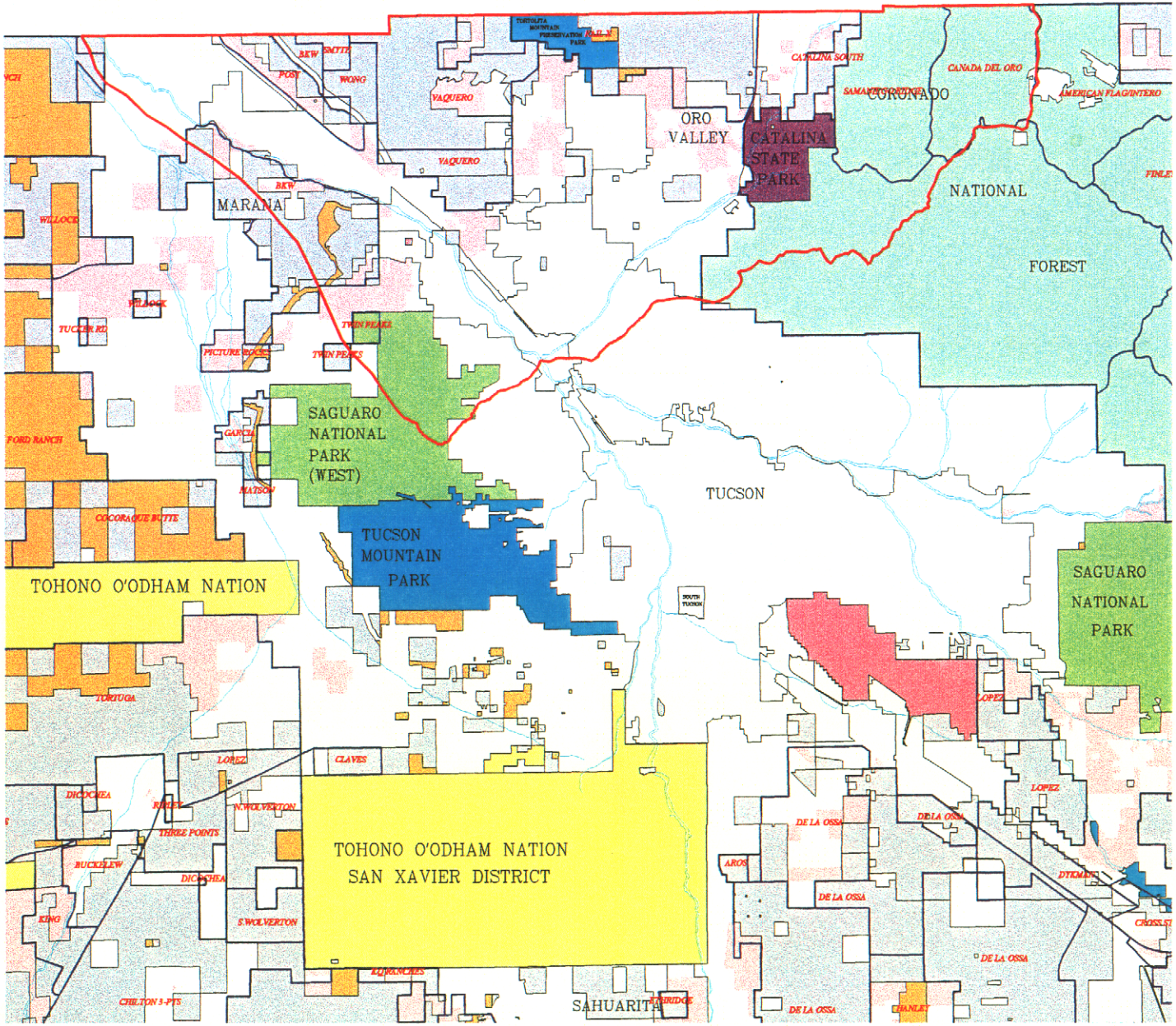
Summary & Conclusions:

To conclude, only the western reaches of the Tortolita Fan and portions of the National Forest continue to support stable and sustainable ranching operations because of the contiguity of predominantly public lands used for ranching. Open space currently accounts for about half of the subarea.

Elsewhere, land in the Tortolita Fan is rapidly urbanizing, and significantly, some 119,000 acres, approximately 60 percent of the land in the subarea, are not used in ranching and agriculture. Fewer than 5,000 of private lands are classified as in ranching use, and nearly 14,000 acres of agricultural croplands could be converted for development in the near future. Private lands of nearly 103,000 acres comprise 50 percent of the subarea, and much of this has been subdivided for development.

Ranch Lands and Grazing Allotments

SDCP PLANNING UNIT 5

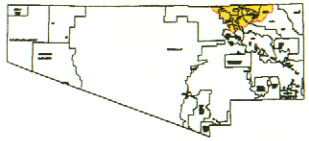


- Planning Unit Boundary
- Grazing Allotments
- Major Washes
- BLM
- COUNTY PARK
- GOLDWATER GUNNERY RANGE
- INDIAN LANDS
- MILITARY RESERVATIONS
- NATIONAL FOREST LANDS
- NATIONAL PARKS AND MONUMENTS
- NATIONAL WILDLIFE REFUGE
- PRIVATE LANDS
- STATE LANDS
- STATE PARK
- RANCH USE

STATISTICS FOR PLANNING UNIT 5

BLM	1,183 AC
COUNTY PARK	3,124 AC
MILITARY RESERVATIONS	40 AC
NATIONAL FOREST LANDS	37,799 AC
NATIONAL PARKS AND MONUMENTS	8,501 AC
STATE LANDS	44,706 AC
STATE PARKS	5,471 AC
PRIVATE LANDS RANCH USE	18,606 AC
PRIVATE LANDS NON-RANCH USE	84,075 AC

Pima County Index Map



Index Map Scale 1:1,500,000

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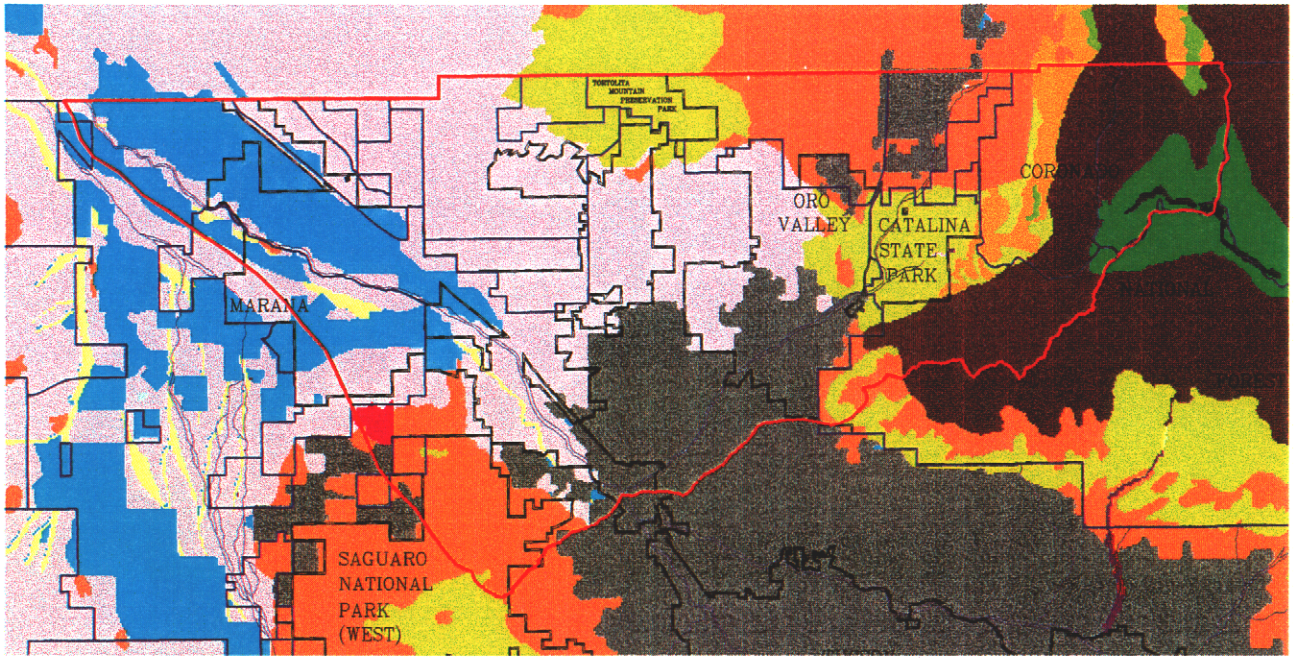
GAP Vegetation and Grazing Allotments

SDCP PLANNING UNIT 5



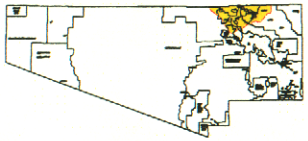
- Watershed Planning Unit Boundary
- Grazing Allotments
- Administrative Boundaries
- Washes
- Agriculture
- Urban
- Mining
- Chihuahuan Desertscrub (Creosotebush–Tarbush)
- Chihuahuan Desertscrub (Mixed Scrub)
- Chihuahuan Desertscrub (Whitethorn)
- Madrean Evergreen Forest (Encinal)
- Madrean Evergreen Forest (Oak–Pine)
- Madrean Montane Conifer Forest (Douglas-Fir–Mixed Conifer)
- Madrean Montane Conifer Forest (Pine)
- Mogollon Chaparral Scrubland (Manzanita)
- Mogollon Chaparral Scrubland (Mixed Evergreen Sclerophyll)
- Mogollon Deciduous Swampforest (Cottonwood–Willow)
- Mogollon Deciduous Swampforest (Mixed Broadleaf)
- Playa
- Scrub Grassland (Mixed Grass–Scrub)
- Scrub Grassland (Sacaton–Scrub)
- Sonoran Deciduous Swamp and Riparian Scrub (Mixed Scrub)
- Sonoran Desertscrub (Creosotebush–Bursage)
- Sonoran Desertscrub (Paloverde–Mixed Cacti)
- Sonoran Desertscrub (Saltbush)
- Sonoran Interior Marshland (Cattail)
- Sonoran Riparian and Oasis Forest (Cottonwood–Willow)
- Unclassified/Mixed
- Water

Minimum Elevation 1,890
Maximum Elevation 8,999

****
VEGETATION ACREAGE

ACRES	BIOME (SERIES)
22,343	Agriculture
0	Chihuahuan Desertscrub (Creosotebush--Tarbush)
0	Chihuahuan Desertscrub (Mixed Scrub)
21,109	Madrean Evergreen Forest (Encinal)
0	Madrean Evergreen Forest (Oak--Pine)
345	Madrean Montane Conifer Forest (Douglas Fir--Mixed)
4,534	Madrean Montane Conifer Forest (Pine)
700	Mining
400	Mogollon Chaparral Scrubland (Manzanita)
4,764	Mogollon Chaparral Scrubland (Mixed Evergreen)
0	Mogollon Deciduous Swampforest (Cottonwood--Willow)
1,372	Mogollon Deciduous Swampforest (Mixed Broadleaf)
21,852	Scrub Grassland (Mixed Grass--Scrub)
0	Scrub Grassland (Sacaton--Scrub)
0	Sonoran Deciduous Swamp and Riparian Scrub (Mixed Scrub)
67,227	Sonoran Desertscrub (Creosotebush--Bursage)
28,032	Sonoran Desertscrub (Paloverde--Mixed Cacti)
12	Sonoran Riparian and Oasis Forest (Cottonwood--Willow)
30,848	Urban
10	Water

Pima County Index Map



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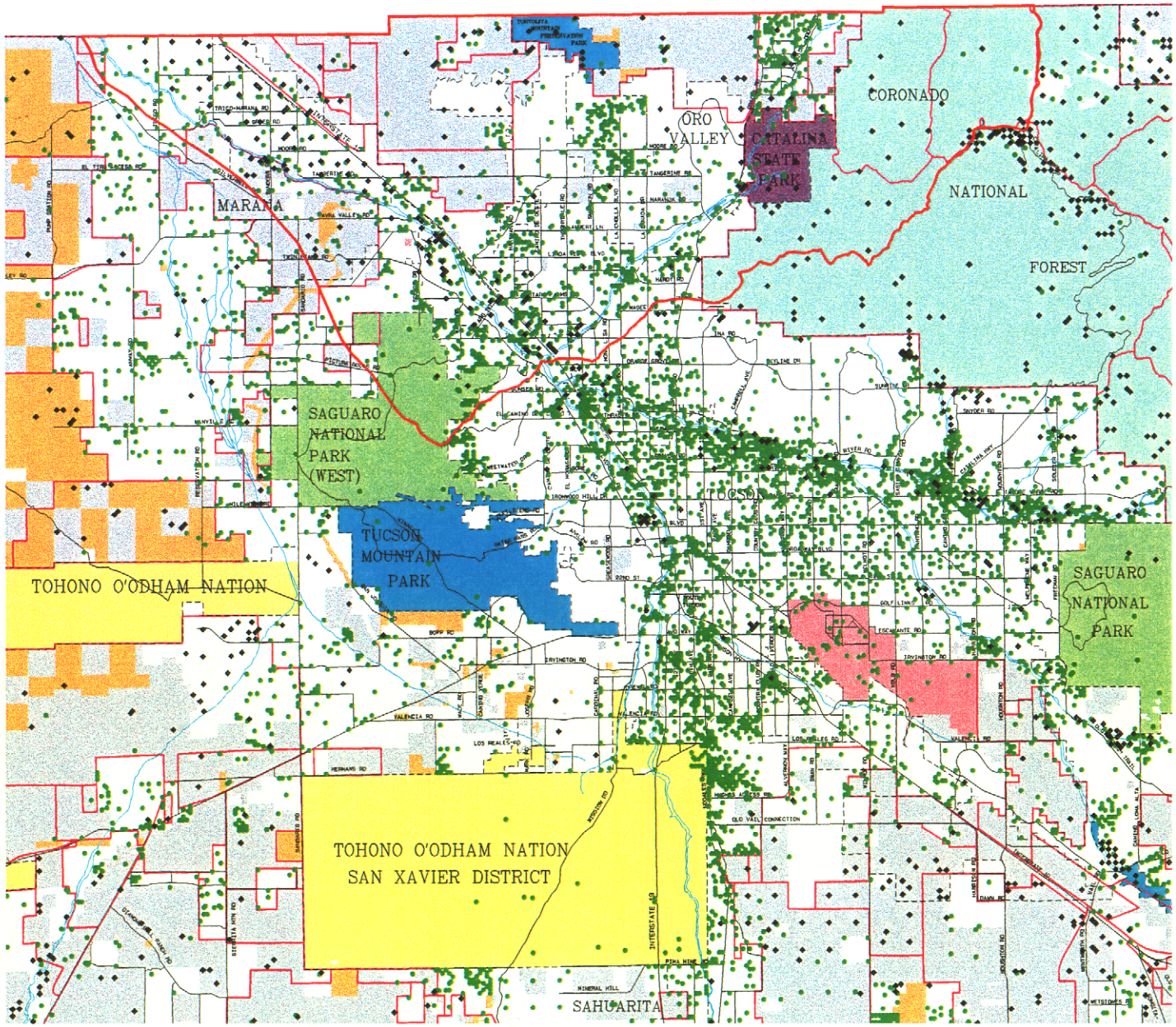
Stock Tanks and Well Sites



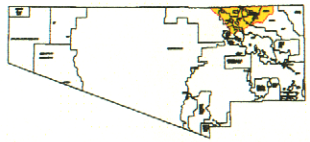
SDCP PLANNING UNIT 5

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

STATISTICS FOR UNIT 5

Well Sites: 1,401
Stock Tanks: 223

Pima County Index Map



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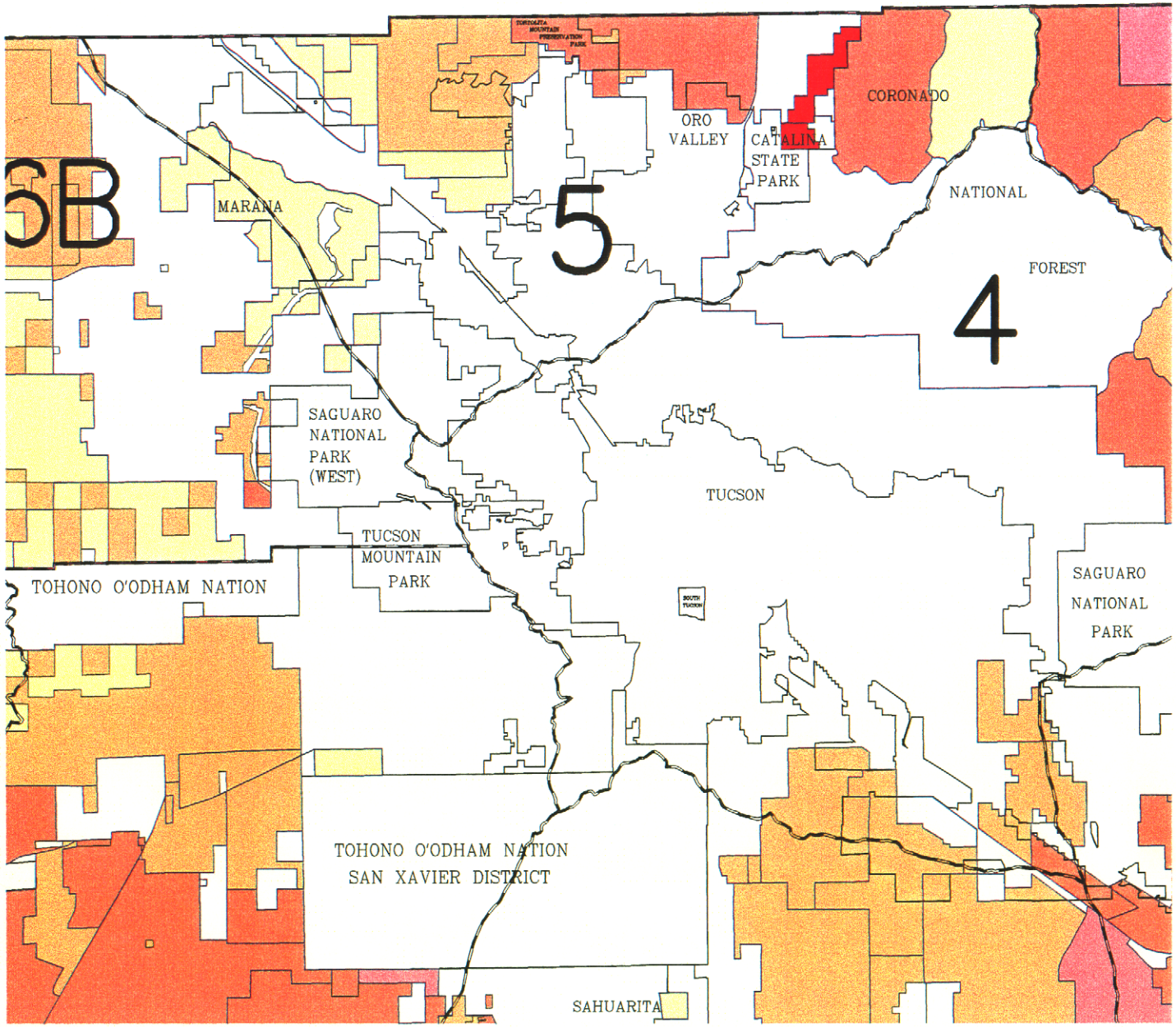
/pygeyow12/sonora/cultural/asnjoined/plan5/aels/ranch_tank5.aml 3/16/00

Carrying Capacity per Square Mile by Grazing Allotment

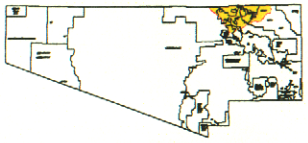


SDCP PLANNING UNIT 5

- 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

Pima County Index Map



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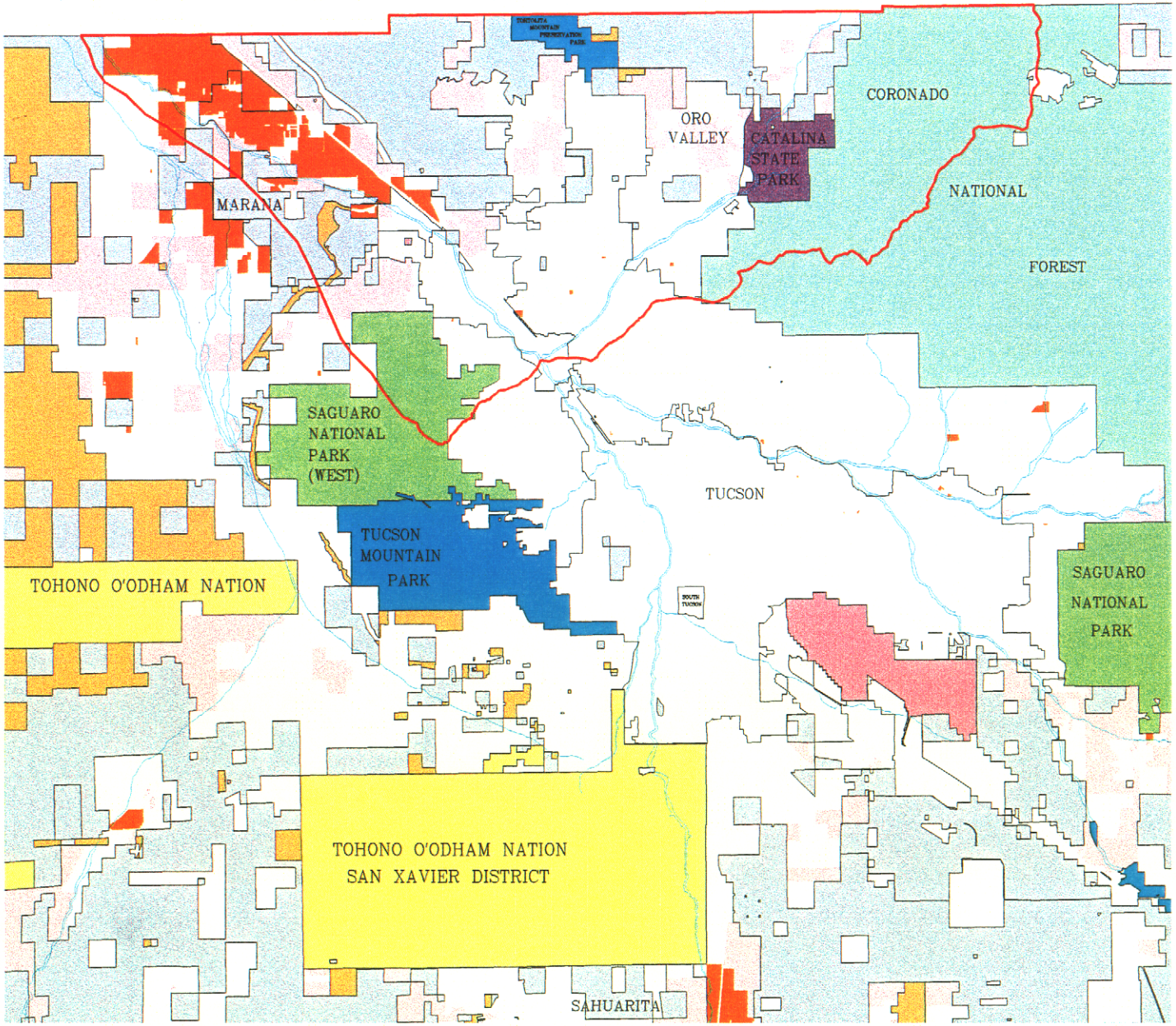
/pygmyow12/sonora/ranch/covers/tort_carry.aml

Plotted: 3/22/00

Agricultural Lands



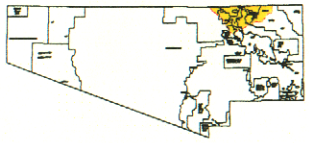
SDCP PLANNING UNIT 5

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

STATISTICS FOR UNIT 5

ACRES OF AGRICULTURAL LAND: 13,821

Pima County Index Map



Index Map Scale 1:1,500,000

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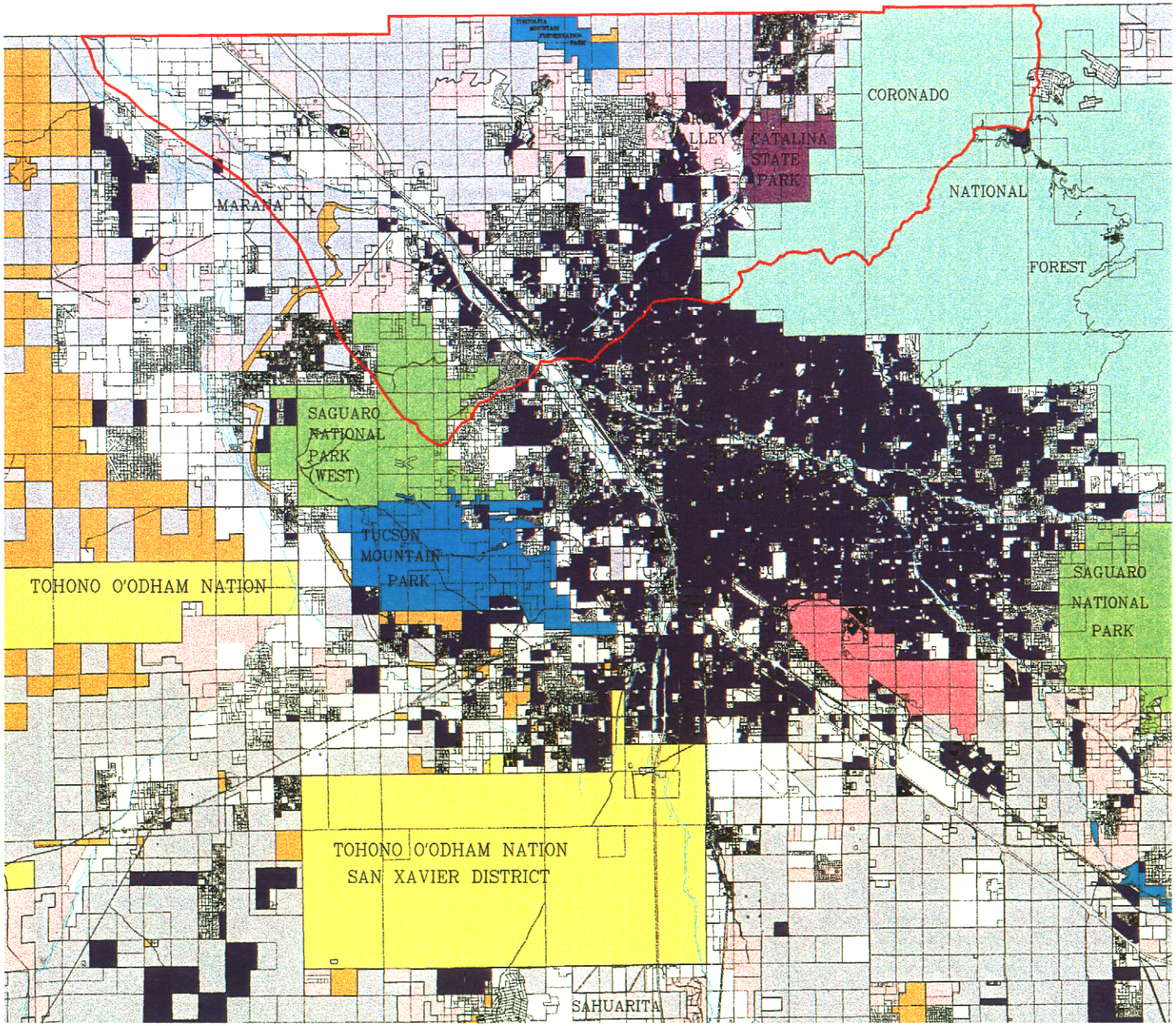
/pyg@yow12/sonora/cultural/esmjoined/plan5/amls/ranch_ag5.aml 5/19/00

Platted Subdivisions



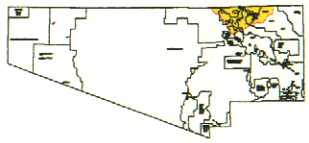
SDCP PLANNING UNIT 5

- Planning Unit Boundary
- Major Washes
- Parcel Lines
- PLATTED SUBDIVISIONS
- BLM
- COUNTY PARK
- GOLDWATER GUNNERY RANGE
- INDIAN LANDS
- MILITARY RESERVATIONS
- NATIONAL FOREST LANDS
- NATIONAL PARKS AND MONUMENTS
- NATIONAL WILDLIFE REFUGE
- PRIVATE LANDS
- STATE LANDS
- STATE PARK
- RANCH USE

STATISTICS FOR UNIT 5

NUMBER OF PLATTED SUBDIVISIONS: 602
ACRES OF PLATTED SUBDIVISIONS: 19,649
NUMBER OF PARCELS: 48,863

Pima County Index Map



Index Map Scale 1:1,500,000

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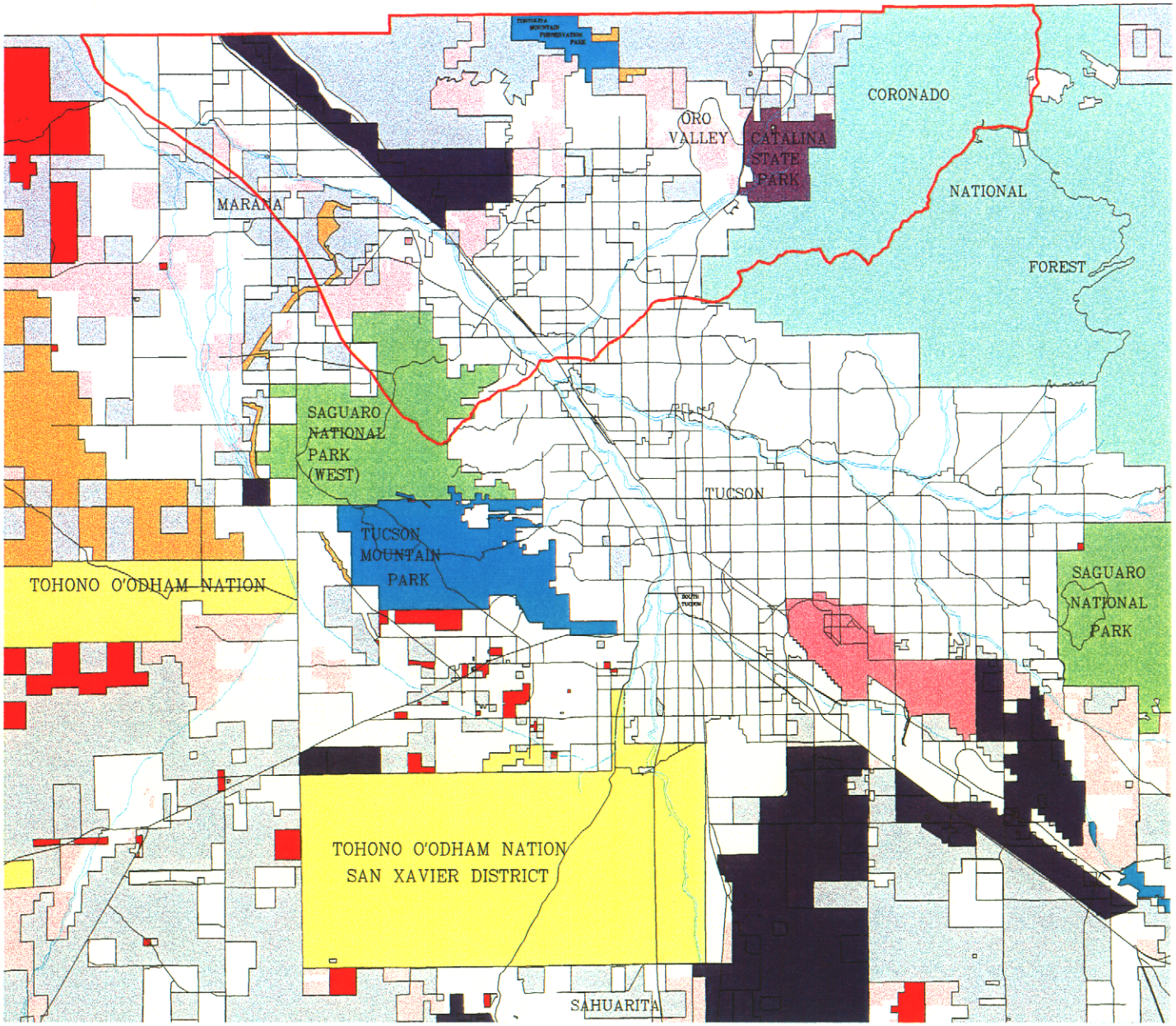
THE SEAL OF PIMA COUNTY ARIZONA

/pygmyowl2/sonora/cultural/asmjoined/plan5/amls/ranch_sub5.aml-bp 3/16/00

Disposable Lands for BLM and State of Arizona



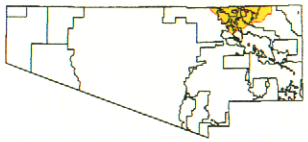
SDCP PLANNING UNIT 5

- Planning Unit Boundary
- Major Washes
- DISPOSABLE BLM LAND
- DISPOSABLE STATE LAND
- BLM
- COUNTY PARK
- GOLDWATER GUNNERY RANGE
- INDIAN LANDS
- MILITARY RESERVATIONS
- NATIONAL FOREST LANDS
- NATIONAL PARKS AND MONUMENTS
- NATIONAL WILDLIFE REFUGE
- PRIVATE LANDS
- STATE LANDS
- STATE PARK
- RANCH USE

STATISTICS FOR UNIT 5

DISPOSABLE BLM LAND: 0 AC.
DISPOSABLE STATE LAND: 11,101 AC.

Pima County Index Map



Index Map Scale 1:3,500,000

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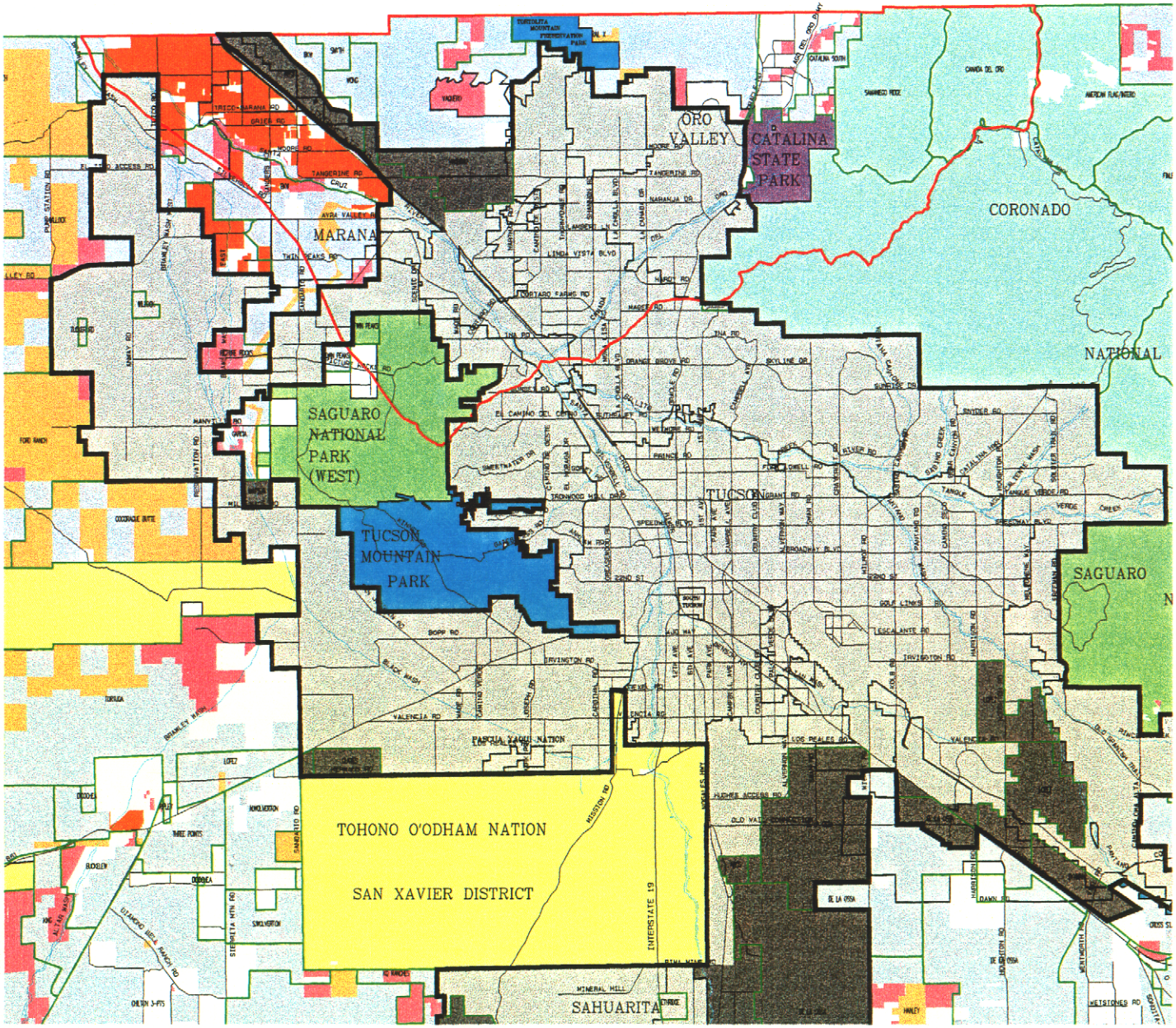
pygmyowl2/sonora/cultural/esmjoined/plan5/amls/ranch_disp5.aml 3/16/00

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



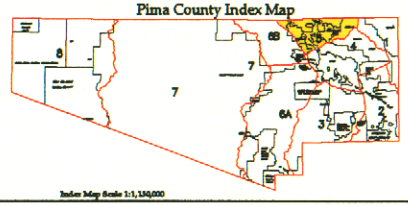
SDCP PLANNING UNIT 5

- 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 LANDS
- STATE PARK
- RANCH USE
- AGRICULTURAL USE
- Urban Boundary
- ASLD / SLUP's

STATISTICS FOR UNIT 5

ACRES OF ASLD/SLUP's 11,100

Pima County Index Map



Index Map Scale 1:1,150,000

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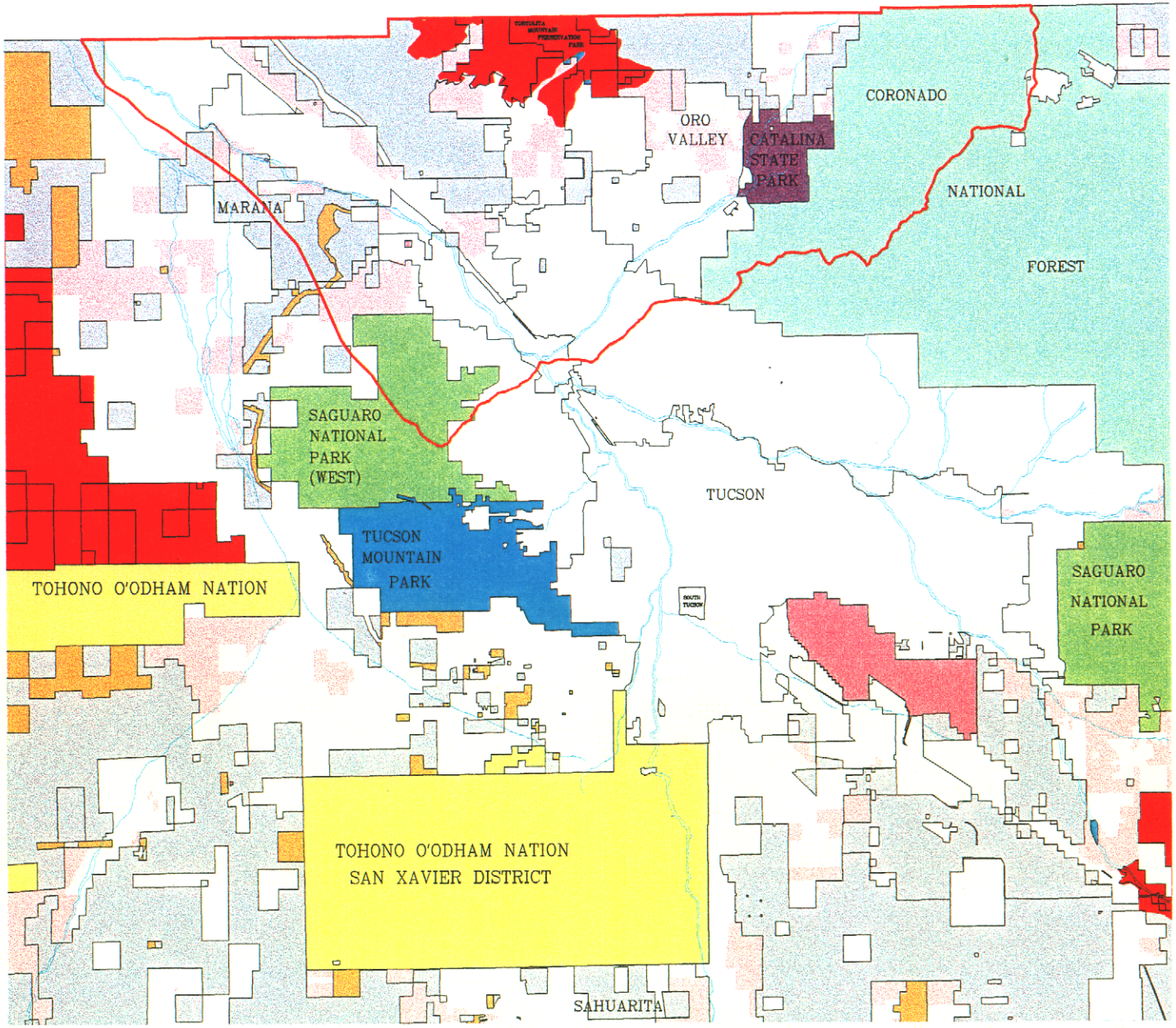
PIMA COUNTY ARIZONA

/pvgmvcw12/sonora/cultural/esmipined/plan5/amls/ranch_urban5.amPlotted: 5/19/00

BLM Long Term Management Lands

SDCP PLANNING UNIT 5

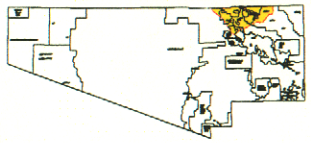


- Planning Unit Boundary
- Major Washes
- BLM LONG TERM MANAGEMENT LANDS
- BLM
- COUNTY PARK
- GOLDWATER GUNNERY RANGE
- INDIAN LANDS
- MILITARY RESERVATIONS
- NATIONAL FOREST LANDS
- NATIONAL PARKS AND MONUMENTS
- NATIONAL WILDLIFE REFUGE
- PRIVATE LANDS
- STATE LANDS
- STATE PARK
- RANCH USE

STATISTICS FOR UNIT 5

ACRES OF BLM LONG TERM MANAGEMENT 12,113

Pima County Index Map



Index Map Scale 1:1,500,000

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SEAL OF PIMA COUNTY ARIZONA

/pygmyowl2/sonora/cultural/sanjoined/plan5/amls/ranch_acec5.aml-op 3/15/00

IV-6a. Ranching in the Altar Valley:

Introduction:

The Altar Valley, the largest of eastern Pima County's valleys remains largely rural and is characterized by significant unfragmented expanses of natural open space, comprised principally of ranch lands and public preserves. The initial occupation of the valley by the prehistoric Archaic peoples dates perhaps as early as 5000 B.C. followed by Hohokam farmers who occupied villages and smaller hamlets from about A.D. 300 to 1450 along the Altar Wash floodplain and near spring sites in the adjacent mountains. Following the Hohokam collapse, little is known of the area until the Spanish missionaries and explorers entered the region in the 1690s and encountered Piman or Tohono O'odham peoples who are likely to be the descendants of the Hohokam. The region was known during Spanish Colonial and Mexican periods as "Pimeria Alta." Arriving about the same time as the Spanish, the Apache, too, frequented this region to search for seasonally available foods and often to raid O'odham settlements for their stores of cultivated foods.

With the acquisition of this region by the United States following the 1854 Gadsden Purchase, some of the first Americans to enter the area were prospective miners in search of gold and silver. Lured to the region by Spanish accounts of rich ore bodies and the discovery of gold and silver elsewhere in southern Arizona, prospectors staked numerous small claims and established sizable mines at Gunsight Mountain in the foothills of the Sierrita Mountains, at Cerro Colorado, and in the Arivaca area. Settlement of the Altar Valley with miners, homesteaders, and ranchers began in earnest in the 1860s and 1870s. Its principal roads, the Sasabe Road and the Ajo road began as stagecoach and freight lines connecting Tucson to Altar in Mexico in 1868 and to the Quijotoa and Ajo mines in 1883. The valley's principal settlements are Robles Junction (Three Points), Sasabe, and Arivaca. Today, the valley continues its ranching tradition and holds the largest number of ranches of any of the eastern Pima County valleys. Many of these ranches date to the initial settlement and homesteading of the valley, comprised of approximately 713,807 acres (1115.3 square miles).

Land & Environmental Setting:

Located to the southwest of the urban Tucson Basin and running parallel to the Santa Cruz valley, the Altar Wash flows north from a divide at Compartidero Flats just north of Sasabe at the Mexican border, and then flows north past Robles Junction into the Avra Valley where it becomes the Brawley Wash. It continues to flow north into the Los Robles Wash and then to its confluence with the Santa Cruz River and then north to the Gila River. Unfortunately, erosion and significant flooding events have caused the Altar Wash to become deeply channelized in portions of the valley.

Unlike the urbanized Tucson area, the Altar valley is largely rural and undeveloped, with its principal settlements at Robles Junction, Arivaca, and Sasabe. Indian lands comprising the San Xavier and Schuk Toak districts of the Tohono O'odham Nation and the Pasqua Yaqui tribe extend into the valley. Suburban areas southwest of Tucson Mountain Park and north

of the Ajo Highway represent the only urbanized areas in the valley, although significant lot-splitting and wildcat subdivisions occur along the Ajo Highway in the Robles Junction area and to the north, west, and south of the San Xavier District. The Diamond Bell Ranch is the largest platted subdivision located south of the Ajo Highway.

The Altar Valley is bounded by the "Garcia Strip" of the Tohono O'odham Nation on the north, and adjoins the Avra Valley. On the east, the Altar Valley runs along the ridgeline of the Tucson Mountains south across the San Xavier District of the Tohono O'odham Nation to the ridgeline or divides of the Sierrita Mountains, Cerro Colorado Mountains, and the Atascosa Mountains in Santa Cruz County and the Mexican border on the south. To the west, the Altar Valley is bounded by the ridgeline of the Baboquivari, Quinlan, Coyote, and Roskruge mountains, which is also the boundary of the main reservation of the Tohono O'odham Nation. The Altar Valley watershed reflects a significant range in elevation from 2257 to 7505 feet.

As with much of the Basin and Range province of the greater Southwest, the rugged mountain terrain and river valley support a variety of environmental zones and vegetation types, ranging from the Altar Wash floodplain to higher elevation evergreen forests of the Baboquivari, Sierrita, and San Luis mountain ranges that surround the valley. Much of the valley is characterized by a broad, gently sloping bajada that accommodates broad expanses of grasslands that extend into the foothills of the surrounding mountain ranges.

Table IV-6a.1. Major Vegetation Zones in the Altar Valley Watershed in Pima County

▸ Agriculture/Pasture	6,683 acres	0.9 percent
▸ Urban	9,572	1.3
▸ Unclassified	392	0.0
▸ Water surface	280	0.0
▸ Creosote-Tarbush	1,678	0.2
▸ Cottonwood-Willow	156	0.0
▸ Cattail-Marshland	356	0.0
▸ Paloverde Scrub	133,837	18.7
▸ Creosote-Bursage	58,915	8.3
▸ Deciduous/Riparian	10,483	1.5
▸ Scrub Grassland	461,773	64.7
▸ Mixed Broadleaf	1,122	0.2
▸ Chaparral Scrub	230	0.0
▸ Manzanita	1,466	0.2
▸ Oak- Pine Forest	6,263	0.9
▸ Evergreen Forest	20,601	2.9
TOTAL	713,807 acres	99.8 percent

Because of the range in elevation, rainfall, too, is highly variable ranging from about 11 inches annually at the lowest elevations to an estimated 31 inches at the highest elevations. Most of the rainfall in this watershed is estimated to average about 11 - 19 inches annually. This amount of rainfall covers nearly 86 percent of the subarea acreage.

Water is available from a number of springs found mostly in the Baboquivari, Quinlan, and Coyote mountains on the west side of the valley and in the Sierrita Mountains to the east and the Coronado National Forest on the south. Surface water covering some 280 acres is found along perennial and intermittent streams at Arivaca Creek, Brown Canyon, and Thomas Canyon and impounded in Arivaca Lake. The Altar Wash runs for some 89 miles through the valley; however, Mormon Lake and Aguirre Lake no longer hold water – either as a consequence of flooding or from silting in. Shallow ground water has been identified in the Arivaca area and along Arivaca Creek. Numerous stock tanks and wells supplement these natural water sources for cattle and wildlife use. Domestic wells account for approximately 196 wells that are recorded with the Arizona Department of Water Resources.

Table IV-6a.2 Natural & Constructed Water Sources in the Altar Valley Watershed

Springs	Intermit-Streams	Peren-Strms	Lakes	Stock Tanks	Shallow Grnd-Water	Wells
24	ca. 7 mi.	ca. 2.7 mi.	280ac	1099*	3311 acres	1088

*Note that 840 stock tanks occur on ranch lands; there are numerous tanks on the Buenos Aires Refuge no longer in use.

As a consequence of its natural environmental setting that includes an abundance of grassland totaling about 65 percent of the major vegetation type in the valley, numerous natural and created water sources, and a range of environmental zones, which can be seasonally grazed, ranching in the Altar Valley watershed comprises a significant and sustainable land use.

Land Base & Land Uses:

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

Table IV-6a.3 Land Ownership & Jurisdictions in the Altar Valley

National Forest	29,889 acres	4.2 percent
National Wildlife Ref.	112,345	15.7
County Park	7,148	0.1
Indian Reservation	73,223	10.3
BLM	27,172	3.8
State Lands	320,739	45.0
Private Lands	143,200	20.1
Military	9	0.0
Unknown	82	0.0
TOTAL	713,807 acres	99.2 percent

Robles Junction, Arivaca, and Sasabe are the principal settlements in the Altar Valley watershed, and the total population in the entire valley is currently estimated at 23,902

people. Private lands, comprising some 20 percent of the land base, are located throughout the Altar Valley. While some 44 percent of these private lands, or 63,542 acres, are classified as used for ranching or agricultural purposes, some 56 percent of all private lands, or 79,658 acres, are categorized as non-agricultural lands. A significant area of these non-ranching private lands characterizes much of the northeast portion of the subarea lying to the southwest of the Tucson Mountains and north of the San Xavier District. This area, which is experiencing urbanization from the Tucson metropolitan area, essentially marks where the transition from ranching to real estate development is occurring. Some of these lands have been formally platted and other areas reflect lot-splitting or wildcat subdivision areas.

Elsewhere in the Altar Valley, clusters of private lands that are not used for ranching are found in the settlements of Arivaca, Robles Junction, and Sasabe, in the platted subdivision of Diamond Bell Ranch, and in clusters near the Coyote Mountain and Baboquivari Peak wilderness areas, and to the west of the Sierrita Mountains. Throughout the Altar Valley, there are a total of 22,037 parcels recorded with the Pima County Assessor's Office.

Ranches:

As noted earlier, much of the Altar Valley was initially explored by Spanish missionaries including Fr. Kino; however, no permanent Spanish missions or settlements were established here. Instead, Spanish settlement focused on the Piman communities in the Santa Cruz and San Pedro valleys where permanent water was more reliable. It was not until the Gadsden Purchase of 1854 that the Altar Valley experienced its first significant wave of immigrants who were largely American mining prospectors brought to the region in search of gold and silver beginning the 1860s to 1870s.

With the establishment of a freight and stagecoach line by the Aguirre family in 1868 that ran north through the length of the Altar Valley from Altar, Mexico to Tucson, the Altar Valley became more easily accessible for exploration and settlement. With the success of the stage line, Pedro Aguirre established the Buenos Aires Ranch and stage stop in the 1870s at the south end of the valley. With the opening of the mines at Gunsight and Quijotoa, Bernabe Robles established a stage line from these mines running eastward to Tucson in 1883. At the junction of the Aguirre and the Robles stage lines, Bernabe Robles established his Robles Ranch and stage line. These original stage line roads opened the valley for settlement and homesteading and remain the principal routes of access to the valleys today.

The Robles Ranch and the settlement that grew up around it became known as Robles Junction or Three Points, and just south of the Buenos Aires the settlement of Sasabe grew up at the border. With the depletion of the rich ore bodies in the mines that initially brought settlers to the Altar Valley, settlers like Robles and Aguirre refocused their enterprises to ranching. Soon other homesteaders came to the valley and sought to capitalize on its rich grassland environment and the growing cattle market. Ironically, with the exception of the Robles and Buenos Aires ranches, more than 30 ranches, many of which include lands from the original homesteads, continue in operation in this subarea, utilizing private lands, 30 state trust land grazing leases, 28 BLM leases of various parcels, and 3 National Forest leases. These ranches are listed in the following table and are identified by either their ranch name or the name of the grazing lease. Please note that relatively small ranches comprised of only

private lands are not easily identified by name and only a few are noted below; however, the use of these private lands in ranching is included in the total acreage in ranch use calculated for the entire watershed if classified as such by the Assessor's Office. Tohono O'odham and Yaqui tribal lands comprising some 73,223 acres are not included in the analysis; however, it is recognized that portions of these tribal lands in the Altar Valley are probably used for agriculture and for livestock grazing. These larger ranches, which include principally cow-calf and some stocker types of livestock operations, all utilize grazing and ranch management plans under which they implement their state and federal grazing leases.

Table IV-6a.4 Ranches in the Altar Valley Watershed in Pima County

Ranch/Lease Name	Private Land	State Lease	BLM	National Forest Lease
Tortuga Ranch	X	X	X	
Lopez		X	X	
Claves		X		
Dicochea		X		
Ripley		X		
N. Wolverton		X		
S. Wolverton		X		
Dobbs Butte		X	X	
Three Points	X	X	X	
Buckelew		X		
King Ranch	X	X		
KQ Ranch	X	X		
Chilton 3-PTS	X	X	X	
Anvil Ranch	X	X	X	
Gunsight	X	X	X	
Sierrita Ranch	X	X	X	
Treasure Rockhound	X	X	X	
Palo Alto Ranch	X	X		
Elkhorn Ranch	X	X	X	
Chiltipines Ranch	X	X		
Marley Ranch	X	X	X	
Brown Canyon	X	X		
Baboquivari Peak	X	X	X	
Santa Margarita	X	X	X	
Rancho Seco	X	X	X	
Los Encinos	X	X		
Arivaca Ranch	X	X	X	
Chilton Ranch	X	X		X
Rancho El Mirador	X	X		
Carrizo				X
La Osa	X	X		
Cross S				X
Running N Ranch	X			
Noon Ranch	X			
Lopez Ranch	X			
Honnas Ranch	X			

Unique to the Altar Valley is the former Buenos Aires Ranch, now a National Wildlife Refuge. Formed from the original ranch established by Pedro Aguirre in the 1860s, the Buenos Aires Ranch, comprising more than 100,000 acres, was purchased in 1985 by the US Fish and Wildlife Service to serve as a National Wildlife Refuge for the masked bobwhite quail, which had been extinct in the United States since about 1900 and was threatened in Mexico. Prior to its purchase, releases of captive bred birds on the ranch started in the 1970s. When real estate speculation resulted in the break-up of the Victorio Land & Cattle Company and threatened the ranch with development, the US Fish and Wildlife Service purchased the ranch in 1985, ceasing its grazing and livestock operation. Currently, Refuge data indicate that approximately 1500 captively bred birds are released each year, with an estimated 400-700 birds surviving the winters. Their present goal is to reach 500 breeding pairs.

Except for the Buenos Aires Refuge, Tucson Mountain Park, the Coyote Mountains Wilderness Area, platted and wildcat or lot-split subdivision areas, and the town sites, the Altar Valley watershed has 429,321 acres of ranch or agricultural lands, or about 67 percent of the entire watershed if tribal lands are subtracted from the total watershed acreage. If tribal lands are included in the ranching and agriculture category, total agricultural use in the Altar Valley increases to 502,544 acres, or 70 percent of the entire watershed.

Lands not used in ranching or agriculture comprise some 211,262 acres or about 33 percent of the Altar Valley watershed, excluding tribal lands. If tribal lands are included as ranch lands, the percentage of lands not used in ranching is only 30 percent. Much of the non ranch lands include the towns, subdivisions, preserves, and the urbanizing northeastern area.

Of all private lands in the Altar Valley totaling 143,200 acres, approximately 63,542 acres, or 44 percent, are used in ranching, and 79,658 acres, or about 56 percent, have other uses. A total of 314,459 acres of state trust lands appear to be used in grazing, much of the BLM lands totaling 21,431 acres, and National Forest lands totaling some 29,889 acres are designated in grazing leases. Forest lands used in grazing leases distinguish between "capable" range land and "incapable" range land due to rugged terrain and poor access in the higher elevations. For the purposes of this analysis, however, it is assumed that approximately 29,889 acres of National Forest lands are available for grazing in this watershed.

Table IV-6a.5 Ranch lands in the Altar Valley Watershed in Pima County

Land Owner	Ranch Use	Non-Ranch Use	Total
National Forest	29,889 ac	(Rugged terrain?)	29,889 ac
State Trust Land	314,459	6280	320,739
BLM Lands	21,431	5740	27,171
National Wildlife Ref.		112,345	112,345
County Parks		7148	7148
Private Owners	63,542	79,658	144,200
Military + Unclassified		91?	91
TOTAL	429,321 ac	211,262 ac	640,583 ac*

*Total Acreage shown does not include 73,223 ac. of tribal lands.

Ranch improvements that have been made include ranch headquarters, residences, stables, corrals, irrigated pasture, fencing for lease boundaries and pasture rotation, roads and fire breaks, erosion control, and development of stock tanks and wells as water resources for cattle and wildlife. While many of 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. It has been noted above in Table 2 that natural water sources are relatively abundant in the mountain areas, with 24 springs located mostly in the Baboquivari Mountains, the Sierritas, and in the Coronado National Forest, and there are about 10 miles of perennial and intermittent streams. To supplement natural water sources, approximately 1099 stock tanks have been constructed over time. There are about 840 stock tanks that have been recorded on ranch lands in use today, and approximately 259 stock tanks that are no longer in use on the Buenos Aires Refuge, now closed to grazing. Wells, recorded for both domestic use, for cattle and wildlife, and other uses number 1088 for the entire Altar Valley.

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 US Forest Service, 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 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 the Altar Valley watershed ranges from 3 to 16 animals per square mile depending on the terrain, location of the lease, the health of the range, rainfall, and how it is used. At the present time the 3 National Forest grazing allotments, 28 BLM leases, and 30 State grazing leases allow for a maximum of 6640 animals to be grazed in the entire Altar Valley watershed in Pima County. When this number is considered together with the total acreage of 429,321 acres or 671 square miles, dedicated to ranching, the maximum average number of animals allowed to be grazed is approximately 10 animals per square mile.

Table IV-6a.6 Animal Units Allowed to be Grazed in the Altar Watershed

Range of AUs Allowed	Acres/Sq.Miles in Grazing	Total AUs Allowed	Avg.AU/Sq.Mi.
3 -16	429,321 ac. or 671 Sq.Mi.	6640	9.9

Grazing capacity corresponds with higher elevation and rainfall as shown on the enclosed figure. However, please note again that this number reflects only today's range conditions

and lease terms. The total number of animal units is likely to be changed in the future dependent on climate, rainfall, vegetation cover, and range health.

In addition to grazing, federal and state public lands may be used for hunting, fishing, hiking, riding, and other recreational uses. Although these kinds of uses have not yet been fully quantified, it is likely that recreational use of public lands in the Altar Valley watershed is high due to its relatively close proximity to the Tucson metropolitan area and its relatively easy access. In fact, visitor data kept by one of the ranches to the south of Robles Junction shows that 5110 people signed in at the ranch during a six-month period from September to March, 1999 to access public lands for recreational purposes. This list includes hunters, hikers, families on picnics, campers, riders, and others who signed in at the only access point onto the ranch. Farther south on the Buenos Aires Refuge, personnel there reported as many as 33,000 people used the Refuge lands in 1998-1999 for recreational purposes, which included hunting, camping, mountain biking, horseback riding, camping, and birdwatching. These numbers help to confirm the significant recreational use of the Altar Valley.

Current Farms:

At the present time, there are only limited areas where food or fiber crops are being commercially grown in the Altar Valley watershed. Cotton became particularly important to Arizona's economy during World War I, but it was not grown commercially in the Altar Valley until 1956, when Robert Buckelew purchased the current Buckelew Farm near Robles Junction. This farm is reported to have once been 900 acres in size, but has now been reduced to 300 acres as a consequence of the City of Tucson's efforts to purchase water rights. Cotton, corn, pumpkins, and other crops are still grown, and seasonal pumpkin harvesting is opened to the public at the Buckelew Farm.

Available GIS data indicate there are some 526 acres of land currently irrigated for crops and pasture in the Altar Valley. Assuming the Buckelew Farm comprises some 300 acres, there approximately 226 acres currently in use for irrigated pasture located along the Altar Wash floodplain. With irrigated pasture producing sufficient alfalfa and other forage, cattle may be pastured together in greater numbers while natural range land is rested from grazing for portions of the year. Water for irrigation to these pastures is typically derived from wells.

The total area in the Altar Valley that was ever in agricultural use as croplands or irrigated pasture is 5070 acres. However, the City of Tucson currently owns a total of some 7329 acres, which includes 4544 acres of former agricultural lands that were purchased for their water rights. These areas that were once irrigated farmland tend to be located north of the Ajo Highway in the northern Altar Valley. Approximate acreages for current and historically irrigated agricultural lands are provided below.

Table IV-6a.7 Current Farms or Irrigated Pasture in the Altar Valley Watershed in Pima County

Acres Ever in Agriculture	Food or Fiber Crops	Irrigated Pasture	COT Farms
5070	300	256	4544

Development Pressure & Threats to Ranching:

Development pressure in the Altar Valley watershed in Pima County is variable and dependent on transportation corridors, proximity to the urbanizing Tucson area, where private lands are becoming a commodity for development due to rising real estate values near town sites, and in areas adjacent to existing platted or wildcat subdivisions. As noted above, growth and urbanization is occurring in the northeast portion of the watershed near the Tucson Mountains. Here, ranching is no longer viable, and the transition of ranch lands to real estate is increasing. In fact, there are no state or BLM grazing leases in the area, and the "urban boundary" here may be defined by the boundary of the Tortuga Ranch lease to the west and the San Xavier District of the Tohono O'odham Nation to the south. Both platted and wildcat subdivisions characterize the area located principally to the east of the Brawley Wash. Moreover, due to its proximity to the Tucson metropolitan area, there remains the threat that additional private lands will be developed either as subdivisions or as wildcat subdivisions.

At the present time, there are 114 platted subdivisions comprising some 14,985 acres in the entire Altar Valley watershed in Pima County, and there are approximately 22,037 recorded parcels of land. Approximately 9572 acres have been characterized as urbanized area in this portion of the Altar Valley.

Areas of ranch land fragmentation may be defined as those parcels that are not used in ranching and that have been subdivided or have the potential to be subdivided. Approximately 79,658 acres of private lands are currently not used in ranching and are may be developed. When reviewed on a map, these areas of non-ranch private land holdings cluster in the urbanizing northeast portion of the watershed, to the east of Brawley Wash, at the Diamond Bell Ranch subdivision, in the foothills of the Coyote and Sierrita mountains, and at the Town sites of Arivaca and Robles Junction. With these exceptions, the Altar Valley is comprised of largely unfragmented ranch lands and natural open space that are extensive and uninterrupted, crossing the valley from east to west and north to south.

At the present time there are no areas of committed high density zoning for development outside the 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.

However, the BLM and Arizona State Land Department (ASLD) have identified various parcels for either sale, trade, or commercial lease that total some 21,751 acres. These include a number of BLM parcels located in the Arivaca vicinity, near the Diamond Bell Ranch subdivision, and scattered elsewhere in the valley. These BLM lands total some 19,771 acres.

In addition, the ASLD has identified one Special Land Use Permit (SLUP) area located just north of the San Xavier District and south of the Ajo Highway in the developing northeast portion of the watershed. This SLUP is currently a 5-year grazing permit on lands that have been classified by ASLD for commercial use. Although a 5 year permit, the permit can be canceled at any time by the ASLD. Known as the Claves SLUP, this area comprises some 1980 acres. While much of the BLM land identified for sale or lease may remain in ranch use

or as open space due to their more remote settings and proximity to other ranch lands, there is a much higher probability that the ASLD parcel identified for commercial use will be developed because of its proximity to the developing urban area and it location along transportation corridors.

In summary, the development pressure in the Altar Valley watershed in Pima County is variable at the current time. In the vast expanses of the southern and middle portions of the Altar Valley, development pressure is relatively low due to the stability of ranch land use, largely unfragmented lands, the lack of committed high density zoning, and the distance from any major transportation corridors such as Interstate 10 or 19 or even the Ajo Highway.

The principal threat to the stability of ranching in these portions of the Altar Valley is likely to be due in the future to the transition of ranch lands to real estate, especially in the Arivaca and Sierrita Mountain areas, which will result in development of private lands into either platted or wildcat subdivisions.

In the northern portion of the Altar Valley, urbanization is occurring near the Tucson Mountains, north and south along the Ajo Highway, east of the Brawley Wash, near the Coyote Mountains, and in the vicinity of the Diamond Bell Ranch subdivision. While a land value analysis has not been completed for this assessment, it is likely that land values are increasing and sufficiently high in these areas that private land owners are selling land for development rather than retaining their land for agricultural or ranching use.

Ranch Land Conservation Potential:

Several factors will contribute to the excellent potential for much of the Altar Valley to remain a viable area for sustainable ranching. These factors include: the relative stability and long-term tenure of ranch lands comprised of private lands, State lands, BLM, and National Forest leases; the relatively small acreage of public lands designated for sale or commercial use; low population pressure outside the urbanizing northeastern portion of the valley; the lack of major transportation corridors; relatively long distance and access to the valley south of the Ajo Highway from the Tucson area; its proximity to existing preserves that allow grazing; a high proportion of productive grasslands; good average rainfall; the availability of some irrigated pasture to diversify grazing strategies; and relatively high grazing capacity.

The natural open space of ranch lands will further enhance the existing preserves that surround the valley, which include the Coronado National Forest, the Tohono O'odham Reservation, the Buenos Aires Refuge, and the proposed BLM long term management area comprising some 36,330 acres along the Baboquivari Mountain Range that encompasses the Baboquivari Peak Wilderness Area and the Coyote Mountain Wilderness Area.

While none of these factors guarantees long-term ranch land conservation, the available information suggests that the potential for sustainable ranching is high in portions of the Altar Valley watershed in comparison to some of the other subareas of Pima County. Other portions of the Altar Valley, however, will continue to be susceptible to fragmentation and development as discussed above.

Summary & Conclusions:

To conclude, the Altar Valley watershed continues to support stable and sustainable ranching operations in large part because of its environmental setting and the connectivity of its ranch lands and open space. The valley is located in a rich and varied environment that expresses a range of environmental zones from riparian bottomlands to high elevation evergreen forests, offering the opportunity to use different areas of the valley for grazing as forage becomes available seasonally. The principal vegetation type is scrub grasslands, which comprises some 65 percent of the vegetation in the subarea.

Numerous water sources, both natural and constructed, provide water to both cattle and wildlife throughout the watershed in all elevations.

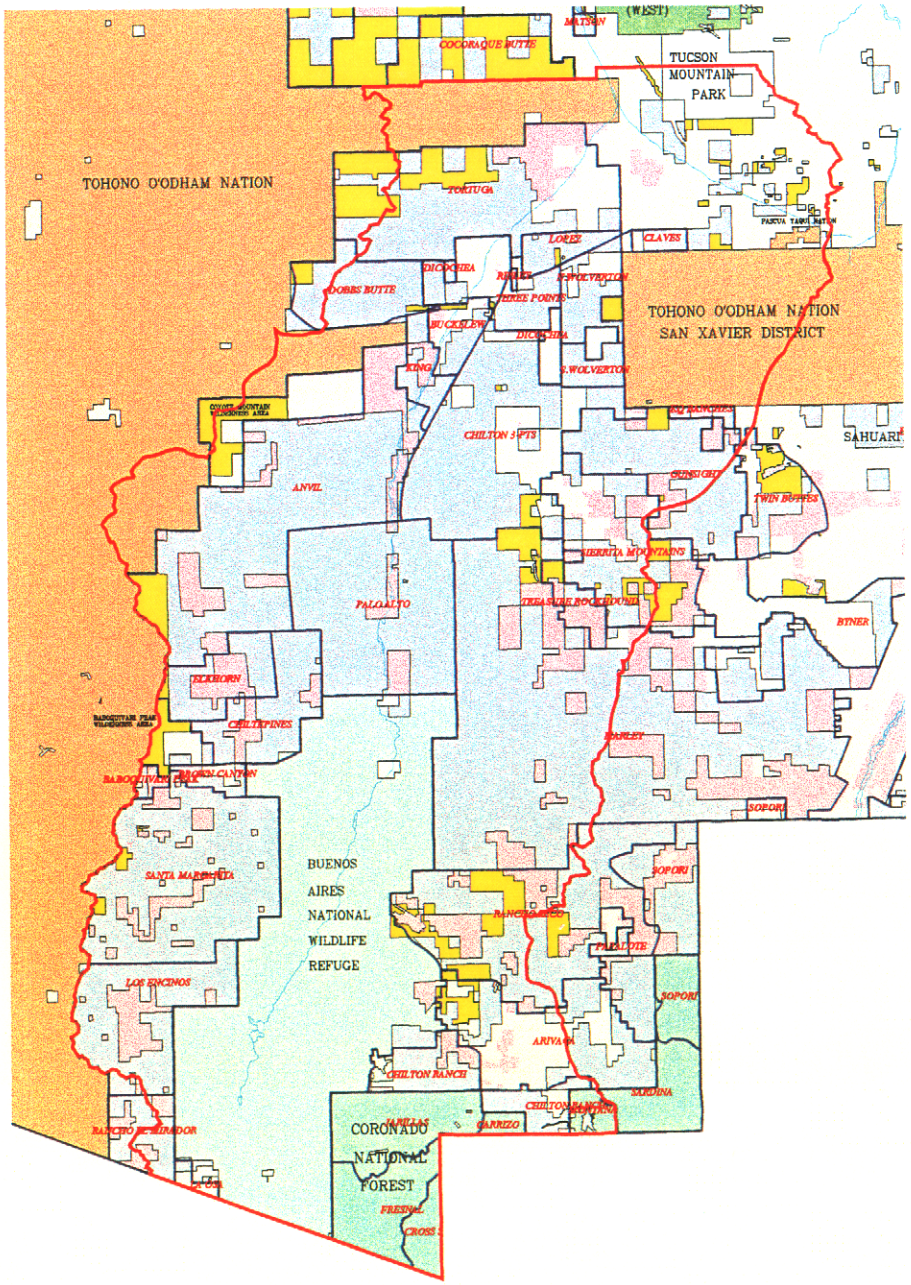
Land use remains largely rural, and significantly, some 429,321 acres, approximately 67 percent of the land in the subarea excluding tribal lands, are used in ranching and agriculture. This includes 63,542 acres, or 44 percent, of all private lands. Some 211,262 acres, or approximately 33 percent, of the entire area are not used for ranch purposes.

At the present time there is limited threat from development pressure in the middle and southern portions of the valley; however, urbanization characterizes the northeastern portion of the valley. Population is relatively low and is estimated at 23,902 people, and there are no committed lands other than 14,985 acres of platted subdivisions that have been zoned for high density development. Recreational use of the valley appears to be high.

The Altar Valley watershed in Pima County currently has a high potential to continue in sustainable ranch use. This conservation potential derives from a productive environmental setting, the availability of water and relatively high rainfall, the long-term stability of ranch lands and grazing leases comprised of private lands, BLM, State lands, and National Forest lands, the relatively high grazing capacity, the lack of significant ASLD lands for sale or commercial lease, the lack of major transportation corridors, and the valley's proximity to existing preserves, much of which is used in ranching.

Ranch Lands and Grazing Allotments

SDCP PLANNING UNIT 6a



STATISTICS FOR PLANNING UNIT 6a

BLM	27,169 AC
INDIAN	73,223 AC
NATIONAL FOREST LANDS	29,889 AC
NATIONAL WILDLIFE REFUGE	112,345 AC
NATIONAL PARKS AND MONUMENTS	6,154 AC
STATE LANDS	320,706 AC
PRIVATE LANDS	144,230 AC

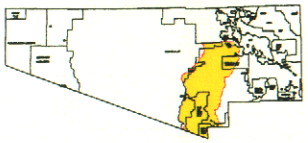
of the private lands,

RANCH USE	94,531 AC
NON RANCH USE	49,699 AC

22,037 parcels

- Planning Unit Boundary
- Grazing Allotments
- Major Washes
- BLM - 27,169 ac.
- INDIAN - 73,223 ac.
- NATIONAL FOREST LANDS - 29,889 ac.
- NATIONAL WILDLIFE REFUGE - 112,345 ac.
- NATIONAL PARKS AND MONUMENTS - 6,154 ac.
- STATE LANDS - 320,706 ac.
- PRIVATE LANDS - 144,230 ac.
- RANCH USE - 94,531 ac.

Pima County Index Map



Index Map Scale 1:1,500,000

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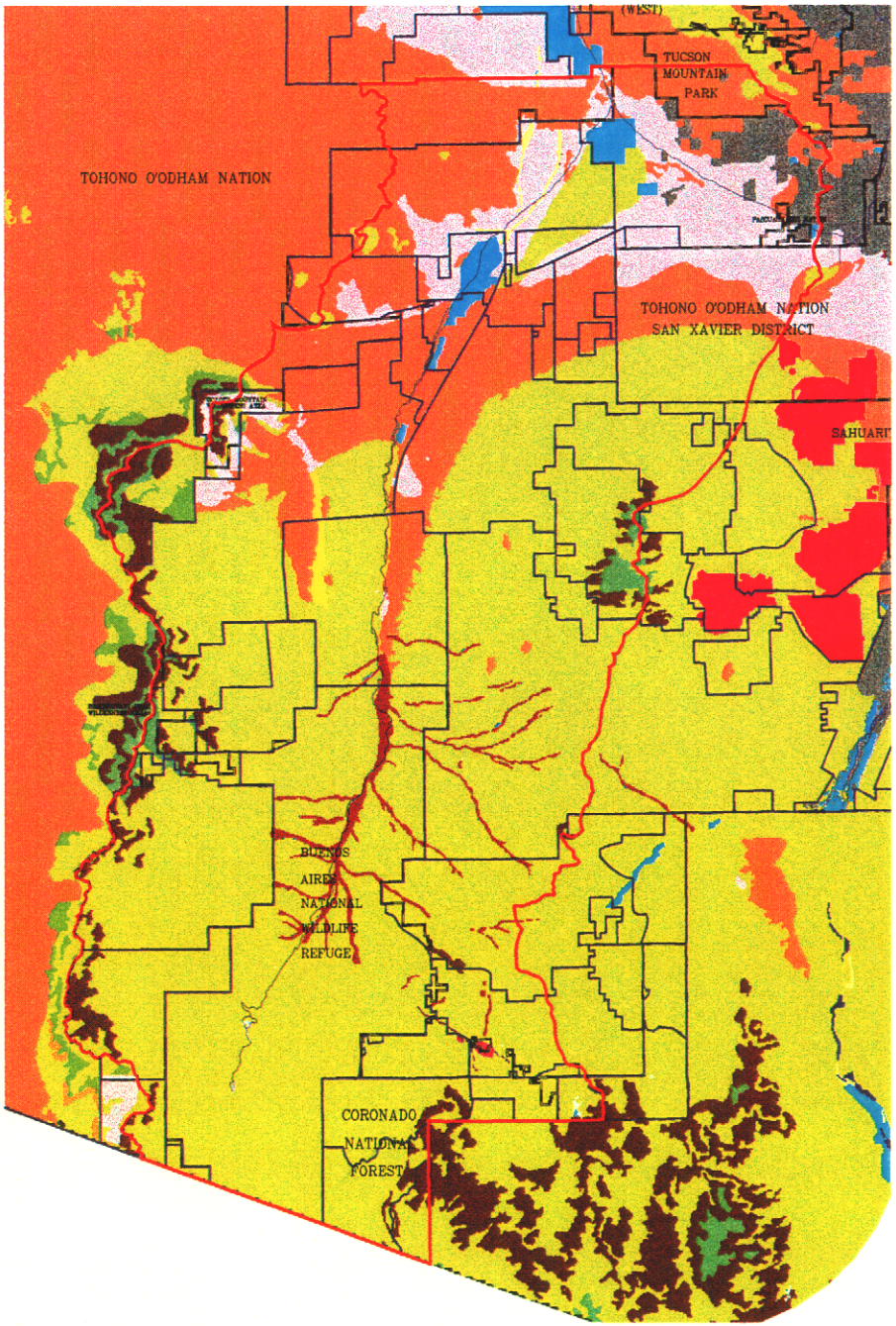
THE SEAL OF PIMA COUNTY ARIZONA

/pygmyowl2/sonora/cultural/asnjoined/plan6a/amls/ellot6a.aml-op Plotted 3/8/00

GAP Vegetation and Grazing Allotments

SDCP PLANNING UNIT 6A



Minimum Elevation: 2,257 ft
Maximum Elevation: 7,505 ft

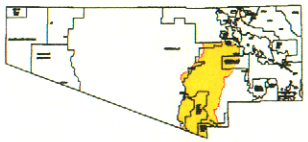
****
VEGETATION ACREAGE

ACRES	BIOME (SERIES)
6,683	Agriculture
1,678	Chihuahuan Desertscrub (Creosotebush--Tarbush)
20,601	Madrean Evergreen Forest (Encinal)
6,263	Madrean Evergreen Forest (Oak--Pine)
1,466	Mogollon Chaparral Scrubland (Manzanita)
230	Mogollon Chaparral Scrubland (Mixed Evergreen Sclerophy)
1,122	Mogollon Deciduous Swampforest (Mixed Broadleaf)
461,773	Scrub Grassland (Mixed Grass--Scrub)
10,483	Sonoran Deciduous Swamp and Riparian Scrub (Mixed Scrub)
58,915	Sonoran Desertscrub (Creosotebush--Bursage)
133,837	Sonoran Desertscrub (Paloverde--Mixed Cacti)
356	Sonoran Interior Marshland (Cattail)
156	Sonoran Riparian and Oasis Forest (Cottonwood--Willow)
351	Unclassified
9,572	Urban
280	Water

3/8/00

- Watershed Planning Unit Boundary
- Administrative Boundaries
- Washes
- Agriculture
- Urban
- Mining
- Chihuahuan Desertscrub (Creosotebush--Tarbush)
- Chihuahuan Desertscrub (Mixed Scrub)
- Chihuahuan Desertscrub (Whitethorn)
- Madrean Evergreen Forest (Encinal)
- Madrean Evergreen Forest (Oak--Pine)
- Madrean Montane Conifer Forest (Douglas-Fir--Mixed Conifer)
- Madrean Montane Conifer Forest (Pine)
- Mogollon Chaparral Scrubland (Manzanita)
- Mogollon Chaparral Scrubland (Mixed Evergreen Sclerophyll)
- Mogollon Deciduous Swampforest (Cottonwood--Willow)
- Mogollon Deciduous Swampforest (Mixed Broadleaf)
- Playa
- Scrub Grassland (Mixed Grass--Scrub)
- Scrub Grassland (Sacaton--Scrub)
- Sonoran Deciduous Swamp and Riparian Scrub (Mixed Scrub)
- Sonoran Desertscrub (Creosotebush--Bursage)
- Sonoran Desertscrub (Paloverde--Mixed Cacti)
- Sonoran Desertscrub (Saltbush)
- Sonoran Interior Marshland (Cattail)
- Sonoran Riparian and Oasis Forest (Cottonwood--Willow)
- Unclassified/Mixed
- Water

Pima County Index Map



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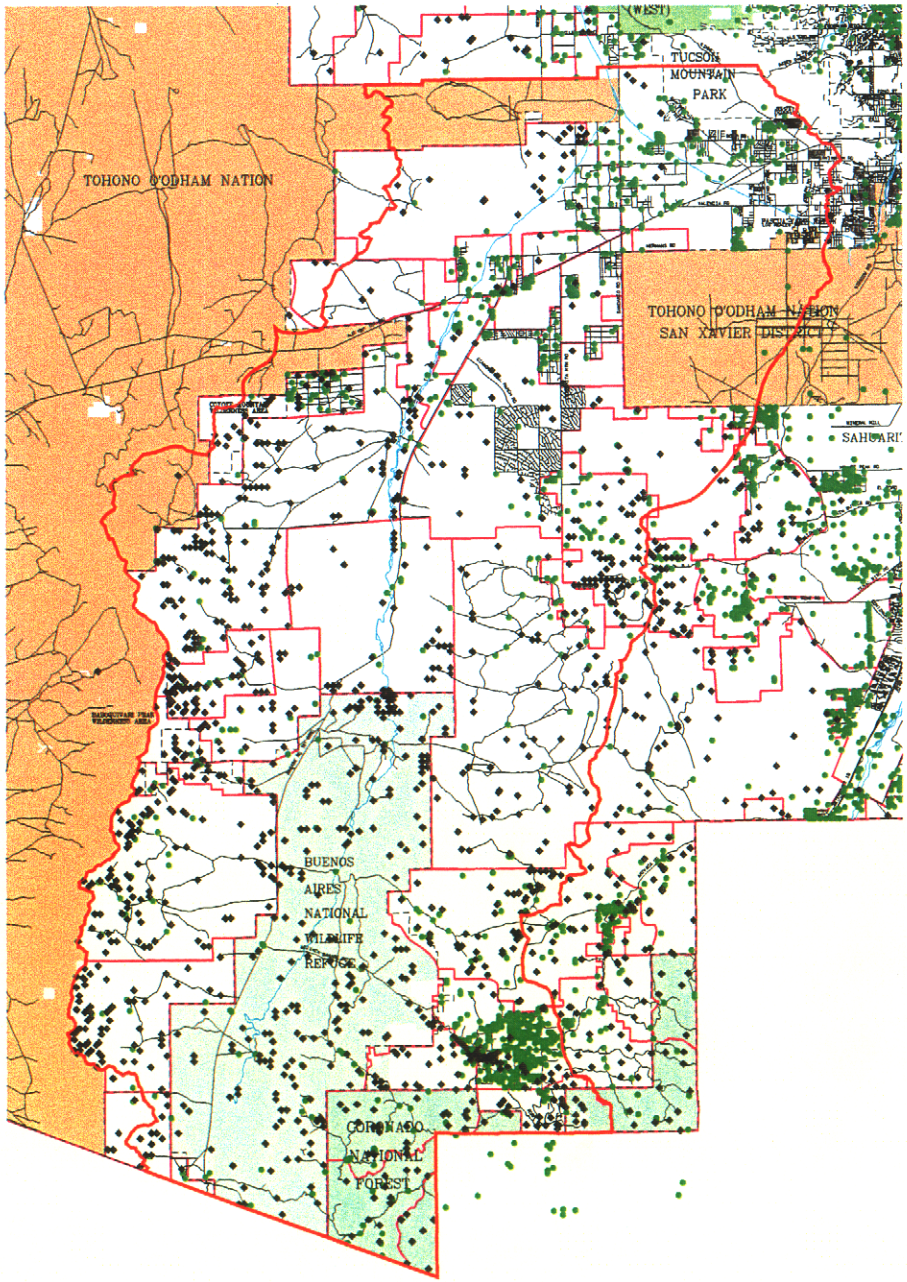
/pygmyowl2/sonora/cultural/asmjoined/plan6A/covers/ranch_gap6a.aml

Stock Tanks and Well Sites



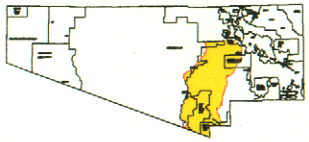
SDCP PLANNING UNIT 6a

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

STATISTICS FOR UNIT 6A

Well Sites: 1,088
Stock Tanks: 1,099

Pima County Index Map



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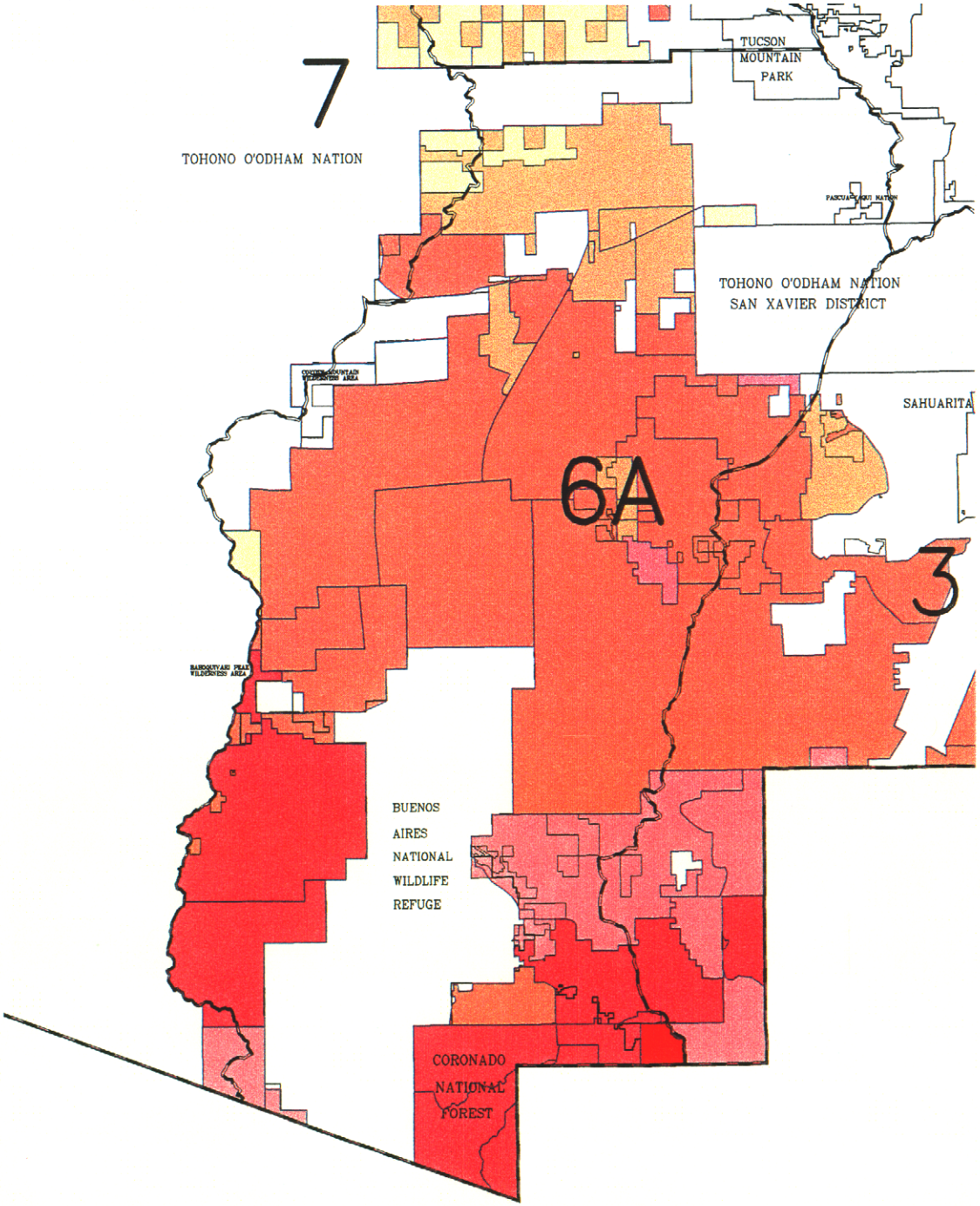
/pygmyowl2/sonora/cultural/asajoined/plan6a/amls/ranch_tank6a.aml Plotted 3/8/00

Carrying Capacity per Square Mile by Grazing Allotment

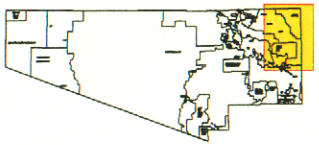


SDCP PLANNING UNIT 6A

- 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

Pima County Index Map



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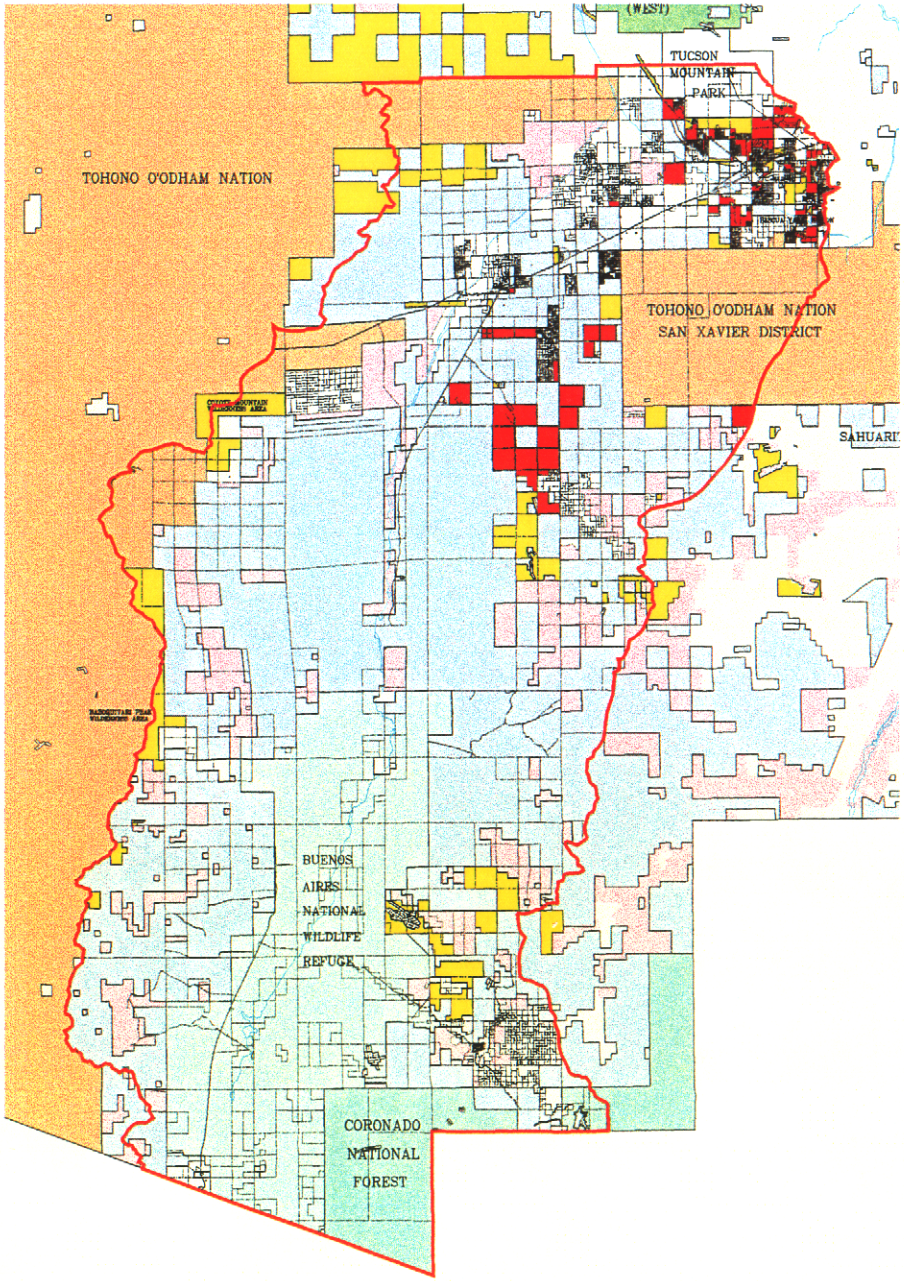
/pygmyowl2/sonora/ranch/covers/altar_carry.aml Plotted: 3/21/00

Platted Subdivisions



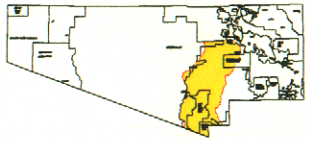
SDCP PLANNING UNIT 6a

- Planning Unit Boundary
- Major Washes
- Parcel Lines
- PLATTED SUBDIVISIONS
- BLM
- INDIAN
- NATIONAL FOREST LANDS
- NATIONAL WILDLIFE REFUGE
- NATIONAL PARKS AND MONUMENTS
- STATE LANDS
- PRIVATE LANDS
- RANCH USE

STATISTICS FOR UNIT 6A

NUMBER OF PLATTED SUBDIVISIONS: 114
ACRES OF PLATTED SUBDIVISIONS: 14,985
NUMBER OF PARCELS 22,037

Pima County Index Map



Index Map Scale 1:1,500,000

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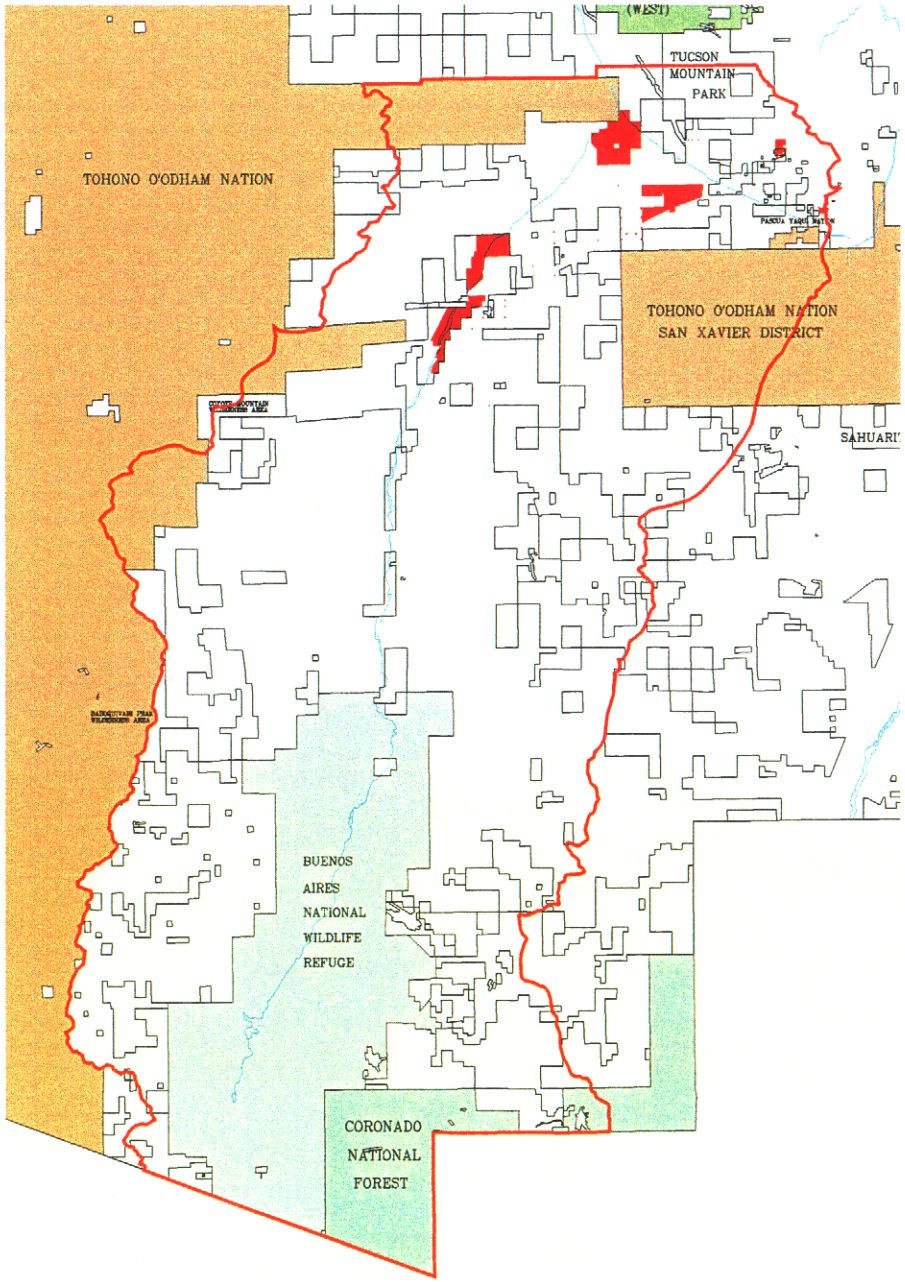
3/9/00

/pygmyowl2/sonora/cultural/ssmjoined/plan6a/smls/ranch_sub.aml-op

City of Tucson Owned Parcels



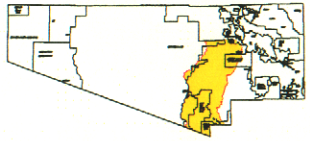
SDCP PLANNING UNIT 6a

- Planning Unit Boundary
- Major Washes
- CITY OF TUCSON PARCELS
- INDIAN
- NATIONAL FOREST LANDS
- NATIONAL WILDLIFE REFUGE
- NATIONAL PARKS AND MONUMENTS

STATISTICS FOR UNIT 6A

ACRES OF CITY OF TUCSON OWNED LAND: 7,329

Pima County Index Map



Index Map Scale 1:1,500,000

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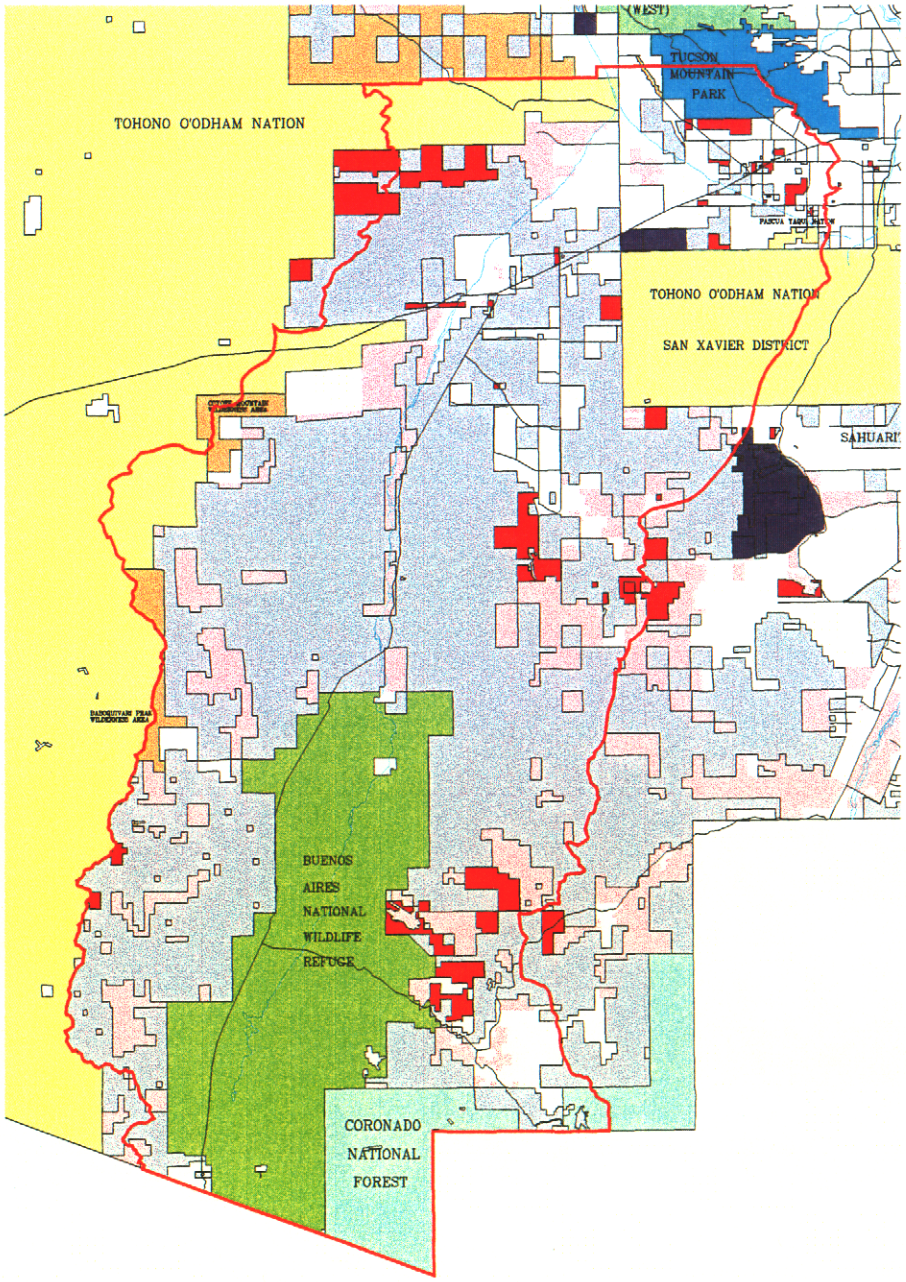
3/9/00

/pygmyowl2/sonora/cultural/esajoined/plan6a/aml5/ranch_city.aml-op

Disposable Lands for BLM and State of Arizona



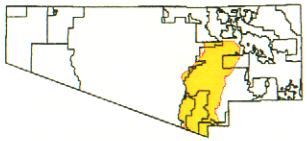
SDCP PLANNING UNIT 6a

- Planning Unit Boundary
- Major Washes
- Disposable BLM Land
- Disposable State Land
- 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

STATISTICS FOR UNIT 6A

DISPOSABLE BLM LAND: 19,771 AC.
DISPOSABLE STATE LAND: 1,980 AC.

Pima County Index Map



Index Map Scale 1:1,500,000

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Scale 1:120,000

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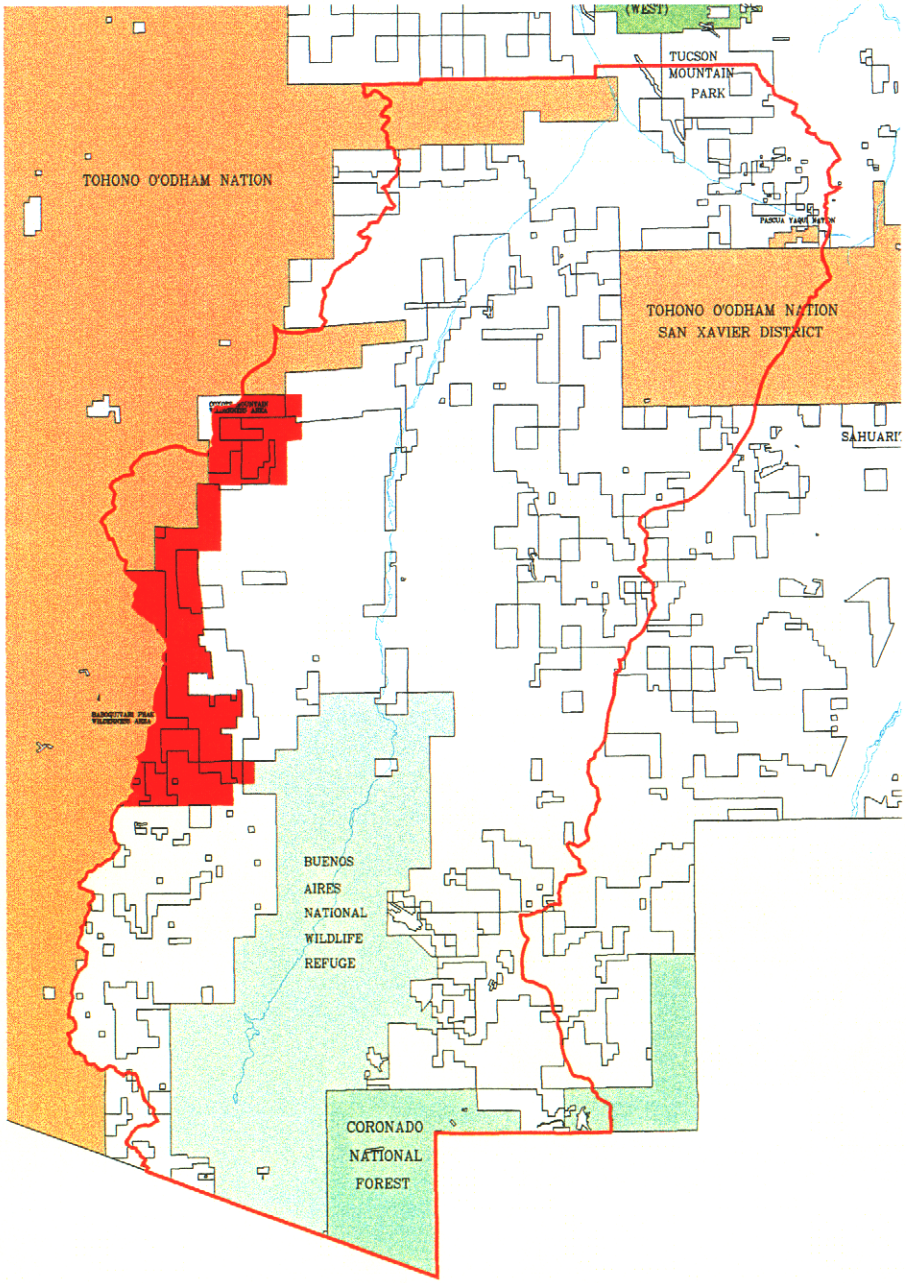
pygmyowl2/sonora/cultural/asmjoined/plan6a/amls/ranch_disp6a.aml 7/19/00

BLM Long Term Management Lands

SDCP PLANNING UNIT 6a

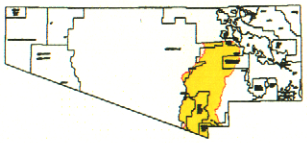


- Planning Unit Boundary
- Major Washes
- BLM LONG TERM MANAGEMENT LANDS
- INDIAN
- NATIONAL FOREST LANDS
- NATIONAL WILDLIFE REFUGE
- NATIONAL PARKS AND MONUMENTS

STATISTICS FOR UNIT 6A

ACRES OF BLM LONG TERM MANAGEMENT 36,330

Pima County Index Map



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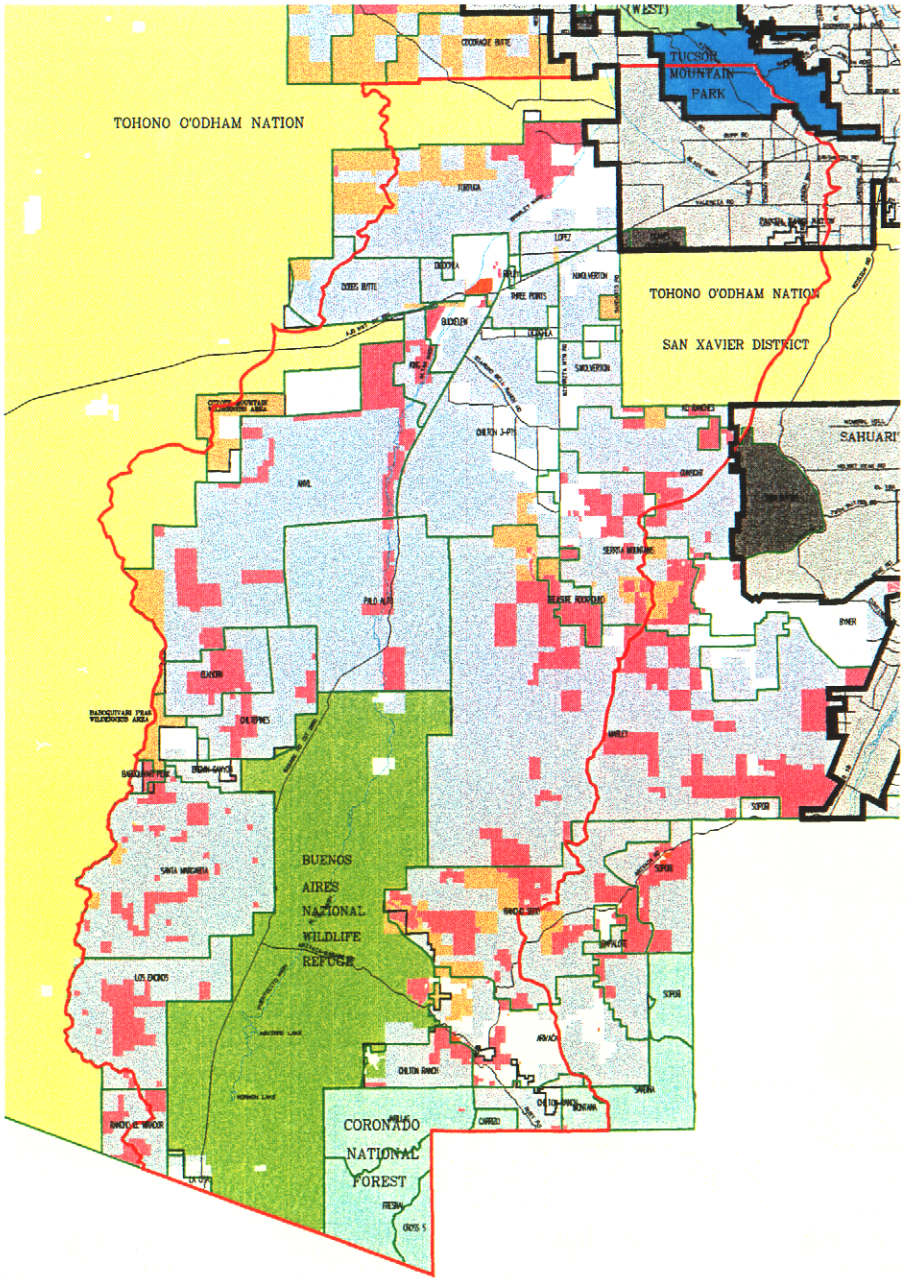
3/9/00

/pygmyowl2/sonora/cultural/asmjoined/plan6a/amls/ranch_acec.aml-ep

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



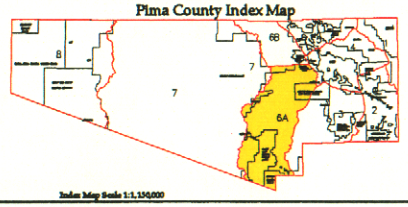
SDCP PLANNING UNIT 6A

- 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 LANDS
- STATE PARK
- RANCH USE
- AGRICULTURAL USE
- Urban Boundary
- ASLD / SLUP's

STATISTICS FOR UNIT 6A

ACRES OF ASLD/SLUP's 1,981

Pima County Index Map



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/pygsyowl2/sonora/cultural/esmjoined/plan6a/amls/ranch_urban6a.04 Submitted: 7/19/00

IV-6b. Ranching in the Avra Valley

Introduction:

The Avra Valley, located to the northwest of Tucson metropolitan area, adjoins the Altar Valley to the south and together these valleys form an extensive corridor through which the Altar Wash and Brawley Wash flow north to the Los Robles Wash and the Santa Cruz River. A portion of the Schuk Toak District of the Tohono O'odham Nation, commonly known as the "Garcia Strip," crosses the valley from east to west dividing the Altar Valley in the south from the Avra Valley to the north. The eastern portion of the valley is being subdivided and marks the edge of the Tucson urban area. The western portion of the Avra Valley remains largely rural and undeveloped, and it is characterized by significant unfragmented expanses of natural open space, comprised principally of ranch lands adjacent to the Tohono O'odham Nation. It is this western portion of the Avra Valley that has recently been designated the Ironwood Forest National Monument.

Historical Background:

It is possible that the initial occupation of the Avra Valley dates to the prehistoric Paleoindian period perhaps as early as 10,000 B.C. that predates the introduction of pottery technology. At the end of the last Ice Age, or Pleistocene period, Paleoindian sites have been recognized by the presence of large, well-made projectile points and other flaked stone tools, found often in association with the butchered remains of now-extinct large mammals such as mammoths. This hunting adaptation suggests a nomadic existence made necessary by the need to follow the movement of large prey animals. At least three lanceolate, fluted projectile points known as Clovis points have been found in the Avra Valley, although none in association with large animal remains. Whether Clovis people actually occupied the Avra Valley is not known, but it seems likely that Clovis people hunted big game animals in or near this valley.

With the extinction of the large Pleistocene mammals, 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. Few early Archaic sites are known, but there is evidence for increasing population and more intensive use of the Avra Valley in the middle and late Archaic periods suggested by more numerous sites and sites that exhibit repeated occupations over time.

With the adoption of agriculture and ceramic technology, the Hohokam occupied villages and smaller hamlets from about A.D. 300 to 1450 along the Brawley Wash floodplain and in "dry-farming" settings in non-riverine areas. In the foothills of the adjacent mountains, there are numerous rock art sites and hillside terrace sites, known as "trincheras," built for habitation, and possible defensive refuge and agriculture. 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 1690s and encountered Piman or Tohono O'odham peoples who are likely to be the descendants of the Hohokam. The region was known during Spanish Colonial

and Mexican periods as "Pimeria Alta." Arriving about the same time as the Spanish, the Apache, too, frequented this region to search for seasonally available foods and often to raid O'odham settlements for their stores of cultivated foods.

With the acquisition of this region by the United States following the 1854 Gadsden Purchase, and the military presence after 1870, some of the first Americans to enter the area were prospective miners in search of gold and silver. Substantial settlement of the Avra Valley with miners, homesteaders, and ranchers began in earnest in the 1870s and opened the Avra Valley for commercial development. Its principal roads, Ajo Road, Avra Valley Road, and Silverbell Road began as stagecoach and freight lines connecting Tucson to various mines in the late 1800s. The valley's principal settlements are Silverbell, Picture Rocks, and suburban areas just west of Saguaro National Park and Tucson Mountain Park. Today, the valley continues its ranching and mining traditions in the western portion of the valley, while experiencing significant growth and urbanization to the east. The Avra Valley is comprised of approximately 221,404 acres (ca. 346 square miles).

Land & Environmental Setting:

Located to the northwest of the urban Tucson Basin and running parallel to the Santa Cruz valley, the Brawley Wash and Black Wash join to flow north from the Altar Valley. The Brawley Wash continues to flow north and splits into Blanco and Brawley washes before joining into the Los Robles Wash and eventually the Santa Cruz River, a distance of some 22 miles.

Unlike the urbanized Tucson area or the largely rural Altar, Empire-Cienega, and San Pedro valleys, the Avra valley is split -- largely rural and undeveloped in its western reaches and urbanizing to the east near Saguaro National Park and the Tucson Mountains and in the center of the valley in the Picture Rocks area. Suburban areas are a mix of platted subdivisions and lot-split subdivisions. These developing areas occur both east and west of the Brawley Wash.

The Avra Valley is bounded by the "Garcia Strip" of the Tohono O'odham Nation on the south, and the Altar Valley farther south. Indian lands comprising the Garcia Strip and the main reservation of the Tohono O'odham Nation form the southern and western boundaries of the valley. The Pinal County line is the north boundary of the planning area. On the east, the Avra Valley runs along the ridgeline of the Tucson Mountains north along a ridgeline that divides Los Robles Wash from the Santa Cruz River. The Avra Valley watershed reflects a range in elevation from 1779 to 4319 feet, one of the lower elevation valleys in eastern Pima County.

As with much of the Basin and Range province of the greater Southwest, the rugged mountain terrain and river valleys support a variety of environmental zones and vegetation types, ranging from the Brawley Wash floodplain to higher elevation Silverbell, Waterman, Roskruge, and Tucson mountain ranges that define the valley to the east and west. Wasson Peak and the Silverbell mountains have the highest elevations over 4000 feet, and it is only in these upland areas that grasslands occur. However, because of the lower elevations, much of the valley is characterized by Sonoran desert scrub creosote, bursage, paloverde, and

ironwood. Former and current agricultural lands also comprise significant acreage in the Brawley Wash. Active mines at Twin Peaks and Silverbell and urbanizing areas indicate areas of intensive land use.

Table IV-6b.1 Major Vegetation Zones in the Avra Valley Watershed in Pima County

▸ Agriculture/Pasture	29,666 acres	13.4 percent
▸ Urban	4,892	2.2
▸ Mining	1,648	0.7
▸ Water surface	34	0.0
▸ Cottonwood-Willow	18	0.0
▸ Paloverde Scrub	97,887	44.2
▸ Creosote-Bursage	75,211	34.0
▸ Scrub Grassland	6,222	2.8
▸ Mixed Broadleaf	5,824	2.6
TOTAL	221,403 acres	99.9 percent

Because of the predominantly lower elevation of the Avra Valley, rainfall, is lower here than other valleys ranging from an estimated 5 inches annually at the lowest elevations to an estimated 15 inches at the mountain uplands. Most of the rainfall in this watershed is estimated to average about 9-11 inches annually. This amount of rainfall covers nearly 90 percent of the subarea acreage.

Water is very limited in this lower elevation valley, and there are no natural springs that are currently identified in the Avra Valley or its surrounding mountains. Surface water covering some 34 acres is probably associated with mining and does not appear to be from natural sources. The Brawley Wash and its tributaries run for some 22 miles through the valley. Shallow ground water has been identified east of the Silverbell Mountains along Cocio Wash, and it is in this area that " Fish's spring" and "Gate's well" are noted on historic maps. Today, numerous stock tanks and wells have been constructed to provide water sources for cattle and wildlife and domestic use. A total of 612 wells are recorded with the Arizona Department of Water Resources. Approximately 334 may be currently in use as domestic wells.

Table IV-6b.2 Natural & Constructed Water Sources in the Avra Valley Watershed

Springs	Intermit-Streams	Peren-Strms	Lakes	Stock Tanks	Shallow Grnd-Water	Wells
0	ca. 22 mi.	0 mi.	0ac	76	369 acres	612

Despite its lower elevation and limited surface water sources, stock tanks and wells located principally on BLM and State lands allow ranching in the western reaches of the Avra Valley watershed to continue as an important and sustainable land use.

Land Base & Land Uses:

Nearly all of the Avra Valley subarea is located in unincorporated Pima County except for its far northeastern edge, which is in Marana. Like much of Pima County, the Avra Valley is comprised of a mosaic of land ownership including federal, state, and private lands, but a significant portion of this land is publicly owned and managed by the BLM, including much of the Ironwood National Monument. Approximate acreages are provided below for each kind of ownership.

Table IV-6b.3 Land Ownership & Jurisdictions in the Avra Valley

BLM	85,388 acres	38.5 percent
State Lands	48,634	22.0
Private Lands/COT	68,619	31.0
National Parks	13,434	6.1
County Park	4,503	2.0
Indian Reservation	806	0.4
Unknown	20	0.0
TOTAL	221,404 acres	100 percent

Marana, Picture Rocks, Silverbell, and urbanizing areas west of Saguaro National Park are the principal settlement areas in the Avra Valley watershed, and the total population in the entire valley is currently estimated at 10,052 people. Private lands, comprising some 31 percent of the land base, are located principally in the eastern and central portions of the Avra Valley, while public lands are predominant in the western portions. While only some 24 percent of these private lands, or 16,716 acres, are classified as used for ranching or agricultural purposes, some 76 percent of all private lands, or 51,902 acres, are categorized as non-agricultural lands.

A significant area of these non-ranching private lands characterizes much of the northeastern and central portions of the subarea lying to the west of the growing Marana area and to the west of the Tucson Mountains. These areas essentially mark where the transition from agriculture and ranching to real estate development is occurring. While there may have been as many as 29,000 acres used historically for food and fiber crops, today there are only 3578 acres still in cultivation.

More than 15,000 acres of these former agricultural lands have been purchased by the City of Tucson for water rights and are currently vacant, non-agricultural lands, and other areas are formally platted subdivisions or lot-split subdivision areas such as Picture Rocks. Elsewhere in the Avra Valley, clusters of private lands that are not used for ranching are found in the vicinity of the Silverbell and Twin Buttes mines and in a few scattered sections and partial sections in the western half of the valley. Throughout the Avra Valley, there are 40 platted subdivisions comprised of 4,469 acres; however, there are approximately 7,900 separate parcels recorded with the Pima County Assessor's Office.

Ranches:

As noted earlier, much of the Avra Valley was part of the homeland of the Piman-speaking Tohono O'odham, and the valley was a natural route from their settlements in Tucson in the Santa Cruz valley to the western deserts. Although initially explored by Spanish missionaries including Fr. Kino, no permanent Spanish missions or settlements were established here. Instead, Spanish settlement focused on the Piman communities in the Santa Cruz and San Pedro valleys where permanent water was available. It was not until the Gadsden Purchase of 1854 that the Avra Valley experienced its first significant wave of immigrants who were largely American mining prospectors in search of gold and silver.

With the establishment of mines in the Silverbell Mountains, Tucson Mountains, at Snyder Hill and Saginaw Hill, and west to the Quijotoa mines, a number of freight and stagecoach lines were created that crossed the Tucson Mountains and opened up the Avra Valley for settlement. Some of these routes included the Aguirre route from Tucson to Altar, Mexico, the Robles route west from Tucson across Robles Pass to the Quijotoa mines, and other routes across Starr Pass, Gates Pass, Contzen Pass, and the Silverbell Road that ran east to west across the north end of the Avra Valley. Some of these original freight and stage line roads that opened the valley for settlement and homesteading remain the principal routes of access to the valley today.

While mining and freighting initiated the commercial development of the Avra Valley, a few others filed homestead claims for agricultural and ranching uses, although the lack of surface water made these ventures much more difficult. Only a few settlers were attracted to the Avra Valley. Where established, these early ranches typically were located at the interface of the mountain ranges and the upper bajada slopes of the valley where wells could be more easily drilled, and a few early farms were established along the Brawley Wash floodplain where agricultural lands could be more easily developed. Although there were essentially no natural water sources, "charcos," or stock ponds, could be easily created to capture water in the Brawley Wash floodplain and along its tributaries, and wells were reportedly easy to dig, with water found at fairly shallow depths of 35-50 feet.

Some notable early ranches include the Garcia Ranch established about 1915 at the western margins of the valley. This early claim by Jose Jesus Garcia would eventually lead to the establishment of the "Garcia Strip" of the Tohono O'odham Nation established in 1916 that would cross the Avra valley and essentially divide the Avra from the Altar valleys.

The Avra Ranch, which is reported to be derived from a Tohono O'odham word meaning "open" is shown on the 1893 Roskruge map just to the north of the Robles Ranch and south of the Garcia Strip. Later maps would show it some miles north at today's intersection of Picture Rocks Road and Sandario Road. Other ranches shown on early maps include the Cocoraque and Agua Blanco ranches. Between 1911 and 1915, other homesteaders filed claims and sought to capitalize on the growing cattle market.

With the exception of the later Avra Ranch site, the valley's namesake that is now in the middle of the developing Picture Rocks area, some 13 ranches, many of which include lands

from the original homesteads, continue in operation in this subarea, utilizing private lands, 13 State Trust Land grazing leases, 7 BLM leases of various parcels, and 1 State Special Land Use Permit.

Table IV-6b.4 Ranches in the Avra Valley Watershed in Pima County

Ranch/Lease Name	Private Land	State Lease	BLM	National Forest Lease
Agua Dulce Ranch*	X	X	X	
BKW*	X	X		
Cocoraque Butte	X	X	X	
Ford Ranch*	X	X	X	
Garcia Ranch	X	X		
Gee Ranch		X	X	
La Osa		X	X	
Matson		X		
Picture Rocks	X	X		
Tucker Road		X		
Twin Peaks*		X		
Willock Ranch	X	X	X	
Wooden Ranch*	X	X	X	

* Indicates ranches that extend into adjacent watersheds

These ranches listed in the table above are identified by either their ranch name or the name of the grazing lease. Please note that relatively small ranches comprised of only private lands are not noted by name below; however, their use of private lands in ranching is included in the total acreage in ranch use calculated for the entire watershed. Tohono O'odham lands comprising some 806 acres are not included in the analysis; however, it is recognized that portions of these tribal lands in the Avra Valley are probably used for livestock grazing. These larger ranches, which include both cow-calf and steer types of livestock operations, all utilize grazing and ranch management plans under which they implement their state and federal grazing leases.

Except for Saguaro National Park, Tucson Mountain Park, and the active mining areas, and platted and lot-split subdivision areas, the Avra Valley watershed has 149,778 acres of ranch or agricultural lands, or about 68 percent of the entire watershed if tribal lands are subtracted from the total watershed acreage. If tribal lands are included in the ranching and agriculture category, total ranching acreage land use in the Avra Valley increases to 150,584 acres, and most of that ranching area is contained within the new Ironwood National Monument where grazing will continue as a permitted land use.

Lands not used in ranching or agriculture comprise some 70,820 acres or about 32 percent of the Avra Valley watershed, excluding tribal lands. As noted elsewhere, much of the non ranch lands comprise mining areas, platted and wildcat subdivision areas, Saguaro National Park, Tucson Mountain Park, former agricultural land purchased by the City of Tucson, and the urbanizing northeastern area at the edge of Marana.

Of all private lands in the Avra Valley totaling 68,619 acres, approximately 16,716 acres, or 24 percent, are used in ranching, and 51,902 acres, or about 76 percent, have other uses. It should be noted that City of Tucson agricultural lands purchased from private property owners are included in this total. A total of 47,674 acres of State Trust lands appear to be used in grazing and much of the BLM lands totaling 85,388 acres. There are no National Forest lands in the Avra Valley. Unlike other eastern Pima County watersheds, BLM lands comprise the largest public lands acreage in the Avra Valley.

Table IV-6b.5 Ranch lands in the Avra Valley Watershed in Pima County

Land Owner	Ranch/Ag. Use	Non-Ranch Use	Total
State Trust Land	47,674	960	48,634
BLM Lands	85,388	0	85,388
Saguaro National Park	0	13,434	14,434
Tucson Mt. Park	0	4,503	4,503
Private Owners/COT	16,716	51,902	68,619
Unclassified		21?	21
TOTAL	149,778 ac	70,820 ac	220,598 ac*

*Total Acreage shown does not include 806 ac. of tribal lands.

Ranch improvements that have been made include ranch headquarters, residences, stables, corrals, irrigated pasture, fencing for lease boundaries and pasture rotation, roads and fire breaks, erosion control, and development of stock tanks and wells as water resources for cattle and wildlife. While many of 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. It has been noted above in Table 2 that natural water sources are virtually non-existent in the Avra Valley, and only one spring is noted on historic maps of the region. There are about 22 miles of major washes like Brawley Wash and its tributaries. To provide adequate water sources, approximately 76 stock tanks and numerous wells have been constructed over time. Wells, recorded for domestic use, mining, agriculture, and for cattle and wildlife, and other uses number 612 for the entire Avra Valley.

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 the Avra Valley watershed ranges from 1 to 6 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. Only one small State grazing permit allows 7-9 animals per square mile.

At the present time, the 7 BLM leases, and13 State grazing leases allow for a maximum of 834 animals to be grazed in the entire Avra Valley watershed in Pima County. When this number is considered together with the total acreage of 149,778 acres or 234 square miles, dedicated to ranching, the maximum average number of animals allowed to be grazed is approximately 3.6 animals per square mile.

Grazing capacity in the Avra Valley is relatively 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 the Avra Valley. The Silverbell Mountains provide a grasslands environment, typical of the higher elevation Empire-Cienega, Santa Cruz, and Altar valleys.

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 IV-6b.6 Animal Units Allowed to be Grazed in the Avra Watershed in Pima County

Range of AUs Allowed	Acres/Sq.Miles in Grazing	Total AUs Allowed	Avg.AU/Sq.Mi.
1 - 6	149,778 ac. or 234 Sq.Mi.	834	3.6

In addition to grazing, federal and state public lands may be used for hunting, fishing, hiking, riding, and other recreational uses. Although these kinds of uses have not yet been quantified, it is likely that recreational use of public lands in the Avra Valley watershed is high due to its relatively close proximity to the Tucson metropolitan area and its relatively easy access. Moreover, visitor numbers and tourism to the region are likely to increase significantly due to the recent establishment of the Ironwood National Monument.

Current Farms:

At the present time, there are considerably fewer areas where food or fiber crops are being commercially grown in the Avra Valley watershed when compared to earlier efforts of agricultural production. Cotton became particularly important to Arizona's economy during and after World War I, when significant acreage in the lower Santa Cruz floodplain in the Marana area and the Avra Valley came under cultivation. This area near the confluence of Los Robles Wash and the lower Santa Cruz River was ideally suited for agriculture. Marana, "tangle" in Spanish, was known historically for its thick stand of mesquite and desert growth

in this area, and later after the coming of the railroad, it became a "flag station" in 1890, known as Marana.

While a few homesteaders and ranchers had begun relatively small farms in the area, agriculture was very limited until the extensive "Post Farms" project began in 1920, using irrigation pumps and extensive canal networks to irrigate cultivated fields of cotton and other seasonal crops. The settlement and extensive field systems became known as Postvale, distinct from the railroad stop of Marana. A post office for Postvale was established in 1920, but later consolidated with Marana in 1925, when the name reverted to Marana.

Today, available GIS data indicate there are some 3579 acres of land currently irrigated for crops and pasture in the Avra Valley. However, there are nearly 30,000 acres of the Avra Valley that were once under cultivation. Much of this land is considered "prime farmland" by the US Department of Agriculture (USDA). Prime farmland is one of several kinds of important farmland defined by the USDA, considered to be of major importance in meeting the nation's short and long-term needs for food and fiber. Because the supply of high-quality farmland is limited, the USDA encourages the wise use of our nation's farmland, and has mapped these areas based on deep, loamy soils, an adequate and dependable supply of water for irrigation, little slope, soils that are not conducive to erosion, and sufficient growing season. Consequently, with the right combination of soil qualities, growing season, and moisture supply, prime farmland produces the highest yields with minimal expenditure of energy and economic resources, and farming it results in the least damage to the environment.

In all of eastern Pima County in the area surveyed by the USDA, a considerable portion of the prime farmland acreage occurs in the Marana area and Avra Valley. Within Avra Valley, there are nearly 16,000 acres designated as prime farmland, and much of this includes areas once under cultivation as well as the remaining cultivated lands.

These prime farmlands tend to occur in the central portions of the valley along the Brawley Wash floodplain. In the area south of Avra Valley Road, much of this prime farmland has either been developed into suburban residential areas or purchased by the City of Tucson for water rights. Today, prime farmlands comprise approximately 2800 acres out of the remaining 3600 acres of agricultural land in the Avra Valley.

The City of Tucson currently owns 79 parcels of agricultural land comprising a total of some 15,330 acres that were purchased for their water rights. These areas that were once irrigated farmland tend to be located in the central portion of the Avra Valley. Approximate acreages for current and historically irrigated agricultural lands are provided below.

Table IV-6b.7 Current Farms or Irrigated Pasture in the Avra Valley Watershed in Pima County

Acres Ever in Agriculture	Current Croplands	COT Farms	Developed/Vacant Farmland
29,666	3,579	15,330	10,757

Development Pressure & Threats to Ranching:

Development pressure in the Avra Valley watershed in Pima County is variable and dependent on transportation corridors, proximity to the urbanizing Tucson area, where private lands are becoming a commodity for development due to rising real estate values, and in areas adjacent to existing platted or wildcat subdivisions. As noted above, growth and urbanization is occurring in the eastern portions of this watershed near the Tucson Mountains. Here, ranching and agriculture are no longer viable, and the transition of agricultural lands to real estate is increasing. In fact, there are only a few small state grazing leases in the area, and the "urban boundary" here may be defined by the boundary of the contiguous larger ranches to the west that utilize both private land and public land grazing leases in their operations. Both platted and wildcat subdivisions characterize the area located along the Brawley Wash floodplain in the center of the Avra Valley. Moreover, due to its proximity to the Tucson metropolitan area, there is an increasing probability that additional private lands and agricultural lands in the Avra Valley will be developed either as subdivisions or as wildcat subdivisions.

Using contiguous ranch lands and grazing leases to define the urban boundary, nearly one third of Avra Valley in its eastern portion, which is mostly private land, appears likely to be developed. Should development intensify in this area, Tucson Mountain Park and Saguaro National Park will become "islands" of open space in an urbanizing metropolitan area.

At the present time, there are 40 platted subdivisions comprising some 4,469 acres in the entire Avra Valley watershed in Pima County, and there are approximately 7,900 recorded parcels of land. Approximately 4,900 acres have been characterized as urbanized area in the portion of the Avra Valley northwest of Saguaro National Park.

Areas of ranch land fragmentation may be defined as those parcels that are not used in ranching and that have been subdivided or have the potential to be subdivided. Approximately 52,000 acres of private lands are currently not used in ranching or agriculture and may be developed. When reviewed on a map, these areas of non-ranch private land holdings cluster in the urbanizing northeast portion of the watershed near Marana, along the Brawley Wash, in the Picture Rocks area, near Saguaro National Park, and near the mines. With these exceptions, the western two-thirds of the Avra Valley is comprised of largely unfragmented ranch lands and natural open space that are extensive and uninterrupted. It is just this area west of the Brawley Wash and adjacent to the Tohono O'odham Nation where the Ironwood Preserve is proposed.

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.

However, the BLM and Arizona State Land Department (ASLD) have identified various parcels for either sale, trade, or commercial lease. These include several BLM parcels used for grazing that total more than12,000 acres. Although once designated for disposal, these lands will now continue in grazing use within the Ironwood Forest National Monument.

In addition, the ASLD has identified one Special Land Use Permit (SLUP) area located just west of Saguaro National Park along Black Wash in the developing eastern portion of the watershed. This SLUP is currently a 5-year grazing permit on lands that have been classified by ASLD for commercial use. Although a 5 year permit, the permit can be canceled at any time by the ASLD. Known as the Matson SLUP, this area comprises some 645 acres. While much of the BLM land identified for sale or lease may remain in ranch use or as open space due to their more remote settings and proximity to other ranch lands, there is a much higher probability that the ASLD parcel identified for commercial use will be developed because of its proximity to the developing urban area.

In summary, the development pressure in the Avra Valley watershed in Pima County is variable at the current time and nearly split down the valley from east to west. In the eastern and middle portions of the Avra Valley, development pressure is relatively high due to the predominance of private land and expanding urbanization. To the west, the landscape is nearly pristine due to the predominance of public grazing lands and the contiguity and stability of ranch land use that has resulted in a largely unfragmented landscape. 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 Silverbell Mine has had any significant effect on the landscape in the western Avra Valley.

The principal threat to the stability of ranching in the Avra Valley is likely to be due in the future to the continued transition of private ranch lands and agricultural lands to real estate, which will result in either platted or wildcat subdivisions. While a land value analysis has not been completed for this assessment, it is likely that land values are increasing and sufficiently high in these eastern areas of the Avra Valley that private land owners are selling land for development rather than retaining their land for agricultural or ranching use.

Ranch land Conservation Potential:

Several factors will contribute to the very good potential for much of the western Avra Valley to remain a viable area for sustainable ranching. These factors include: the relative stability and long-term tenure of ranch lands comprised of private lands, State lands, and BLM leases; the relatively small acreage of public lands designated for sale or commercial use; low population pressure outside the urbanizing eastern portion of the valley; the lack of major transportation corridors; relatively long distance and access to the valley from the Tucson area; and its inclusion in a BLM long-term management area of about 100,000 acres that may become designated the Ironwood Preserve. Here, the natural open space of ranch lands will further enhance the protection of the significant natural and cultural values in the area, 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 west.

While none of these factors guarantees long-term ranch land conservation, the available information suggests that the potential for sustainable ranching is high in the western portions of the Avra Valley watershed. Other portions of the Avra Valley, however, will continue to be susceptible to fragmentation and development as discussed above.

Summary & Conclusions:

To conclude, the western reaches of the Avra Valley watershed now included in the Ironwood National Monument continue to support stable and sustainable ranching operations ,facilitating the connectivity of its open space by the contiguity of private and public lands used for ranching. Consequently, the western portion of the Avra Valley currently has a reasonably high potential to continue in sustainable ranch use due to the long-term stability of ranch lands and grazing leases comprised of private lands, BLM, and State lands, and the predominance of public lands now included in the Ironwood National Monument.

Land use in the western Avra Valley remains largely rural, and significantly, some 149,778 acres, approximately 68 percent of the land in the subarea, are used in ranching and agriculture. This includes 16,716 acres, or 24 percent, of all private lands. At the present time there is limited threat from development pressure in the western portions of the valley due to the predominance of public lands; however, urbanization characterizes the eastern portion of the valley where most of the land is private. Population is relatively low and is estimated at 10,052 people, and there are no committed lands or specific plan areas, other than 4,469 acres of platted subdivisions, that have been recently zoned for high density development. Recreational use of the valley appears to be high given its proximity to the Tucson area.

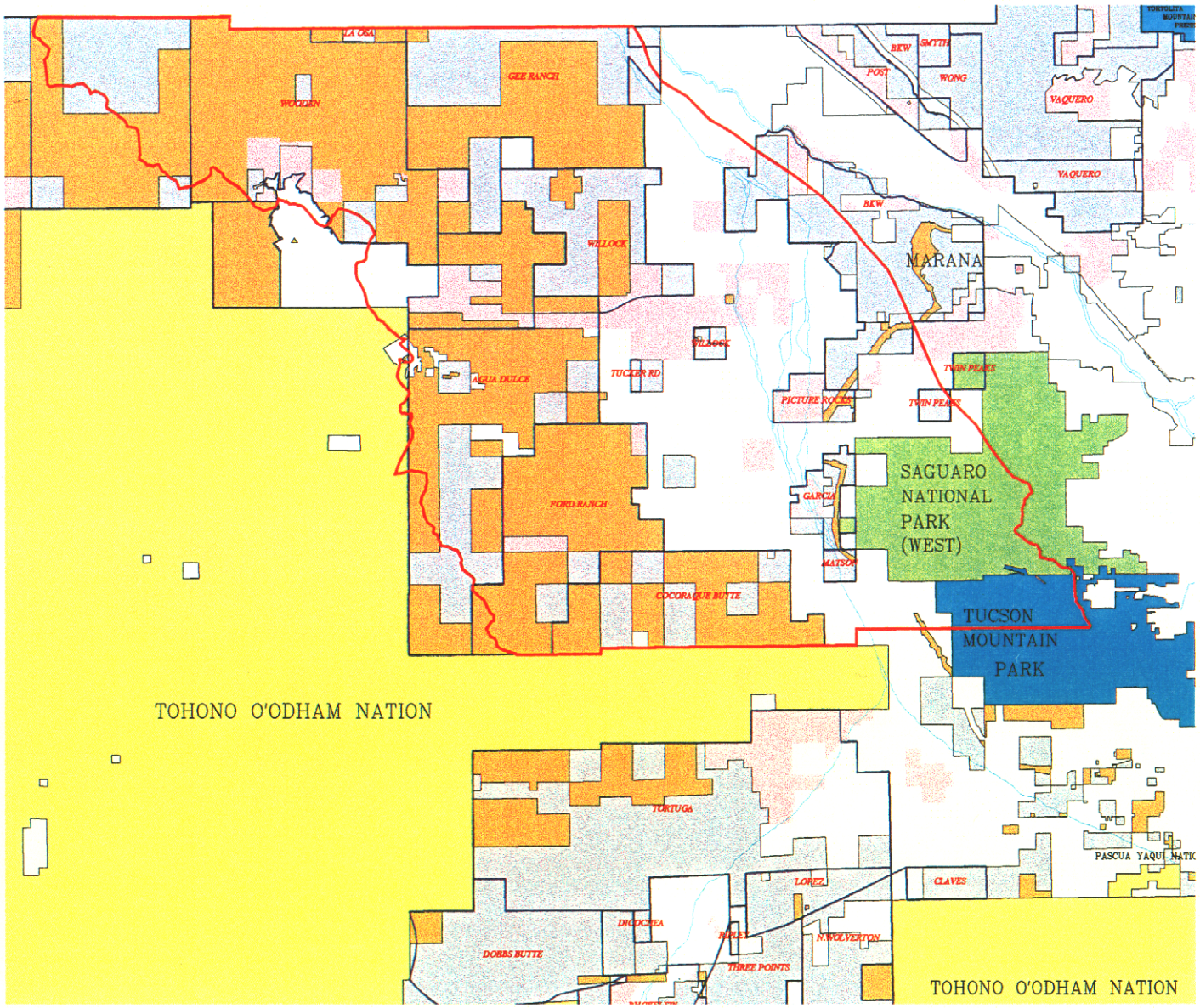
Due to the significant open space, environmental, and cultural values of the Ironwood forest found in western Avra Valley, Pima County earlier requested that the Department of Interior consider options for preserving one of the most valuable stands of ancient ironwood forest within the Sonoran Desert ecoregion. Acting quickly on this request, the new Ironwood National Monument was established in June, 2000 and is located in an area already owned primarily by the BLM, and it extends from the Sawtooth Mountains in Pinal County south to Corcoraque Butte in Pima County. Protection of this area will achieve important and practical conservation goals that are consistent with the Sonoran Desert Conservation Plan - species and habitat conservation, riparian restoration, mountain preserves, ranch conservation, and cultural and historic preservation.

IV-7. Ranching on the Tohono O'odham Nation

While ranching and livestock grazing continue to be a significant land use on the Tohono O'odham Nation lands west of Tucson, this topic was not researched at this time, and no specific information for the Tohono O'odham Nation is included in this current report on Pima County ranch lands.

Ranch Lands and Grazing Allotments

SDCP PLANNING UNIT 6b

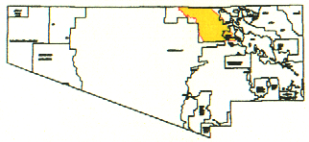


Planning Unit Boundary
Grazing Allotments
Major Washes
BLM
County Park
Indian Lands
Military Reservations
National Forest Lands
National Parks and Monuments
National Wildlife Refuge
Private Lands
State Lands
State Park
Ranch Use

STATISTICS FOR PLANNING UNIT 6b

BLM	85, 388 AC
COUNTY PARK	4, 503 AC
MILITARY RESERVATIONS	0 AC
INDIAN LANDS	805 AC
NATIONAL FOREST LANDS	0 AC
NATIONAL PARKS AND MONUMENTS	13, 434 AC
STATE LANDS	48, 634 AC
STATE PARKS	0 AC
PRIVATE LANDS RANCH USE	16, 716 AC
PRIVATE LANDS NON-RANCH USE	51, 902 AC

Pima County Index Map



Index Map Scale 1:1,500,000

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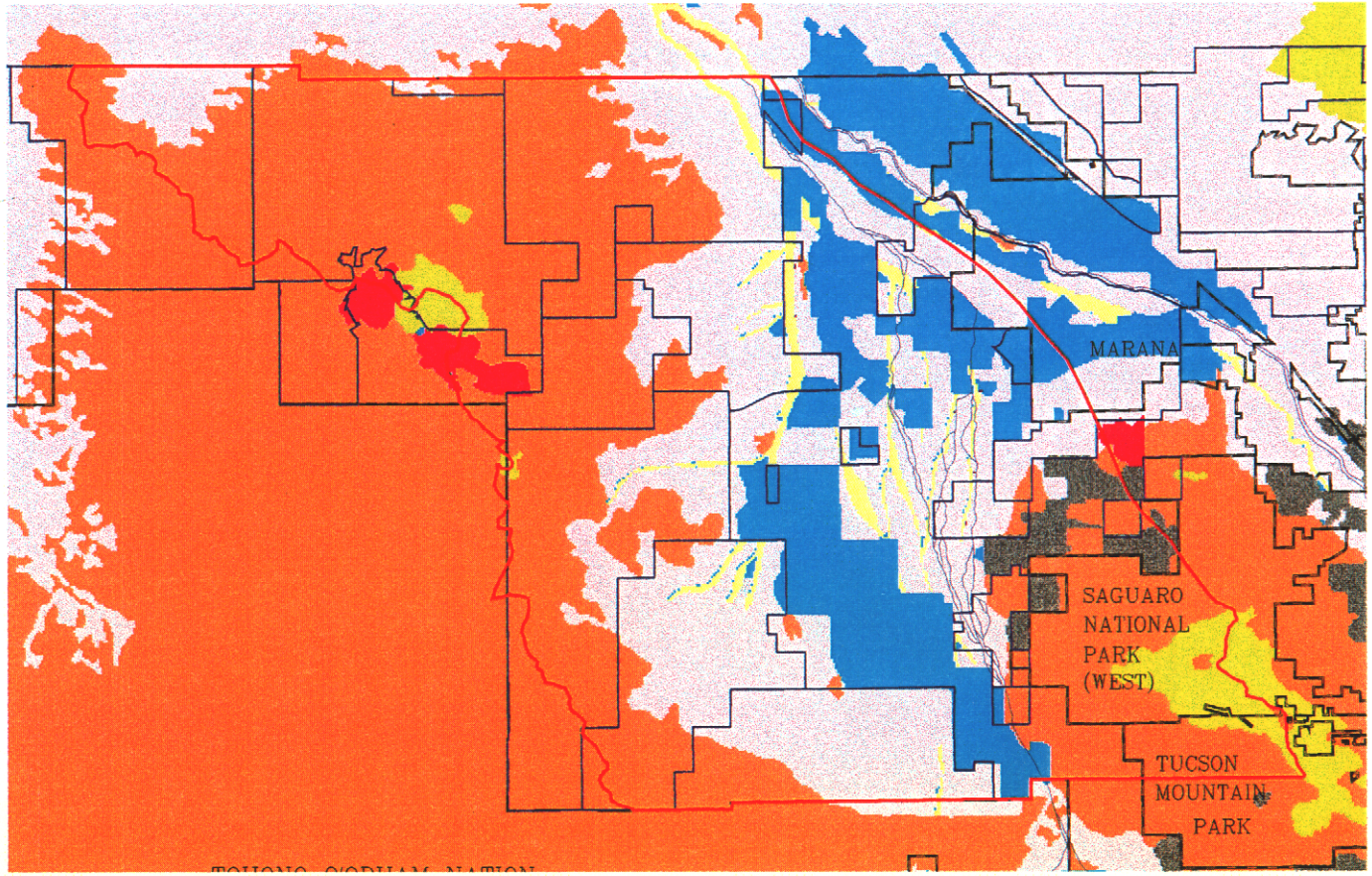
/pyg@yowl2/sonora/cultural/asajoined/plan6b/emls/ranch_allot6b.aml 4/4/00

GAP Vegetation and Grazing Allotments

SDCP PLANNING UNIT 6b



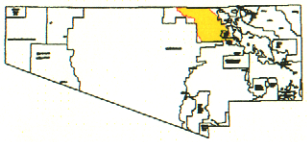
- Watershed Planning Unit Boundary
- Grazing Allotments
- Administrative Boundaries
- Washes
- Agriculture
- Urban
- Mining
- Chihuahuan Desertscrub (Creosotebush--Tarbush)
- Chihuahuan Desertscrub (Mixed Scrub)
- Chihuahuan Desertscrub (Whitethorn)
- Madrean Evergreen Forest (Encinal)
- Madrean Evergreen Forest (Oak--Pine)
- Madrean Montane Conifer Forest (Douglas-Fir--Mixed Conifer)
- Madrean Montane Conifer Forest (Pine)
- Mogollon Chaparral Scrubland (Manzanita)
- Mogollon Chaparral Scrubland (Mixed Evergreen Sclerophyll)
- Mogollon Deciduous Swampforest (Cottonwood--Willow)
- Mogollon Deciduous Swampforest (Mixed Broadleaf)
- Playa
- Scrub Grassland (Mixed Grass--Scrub)
- Scrub Grassland (Sacaton--Scrub)
- Sonoran Deciduous Swamp and Riparian Scrub (Mixed Scrub)
- Sonoran Desertscrub (Creosotebush--Bursage)
- Sonoran Desertscrub (Paloverde--Mixed Cacti)
- Sonoran Desertscrub (Saltbush)
- Sonoran Interior Marshland (Cattail)
- Sonoran Riparian and Oasis Forest (Cottonwood--Willow)
- Unclassified/Mixed
- Water

Minimum Elevation 1,779
Maximum Elevation 4,391

****
VEGETATION ACREAGE

ACRES	BIOME (SERIES)
29,666	Agriculture
0	Chihuahuan Desertscrub (Creosotebush--Tarbush)
0	Chihuahuan Desertscrub (Mixed Scrub)
0	Madrean Evergreen Forest (Encinal)
0	Madrean Evergreen Forest (Oak--Pine)
0	Madrean Montane Conifer Forest (Douglas Fir--Mixed)
0	Madrean Montane Conifer Forest (Pine)
1,649	Mining
0	Mogollon Chaparral Scrubland (Manzanita)
0	Mogollon Chaparral Scrubland (Mixed Evergreen)
0	Mogollon Deciduous Swampforest (Cottonwood--Willow)
5,824	Mogollon Deciduous Swampforest (Mixed Broadleaf)
6,223	Scrub Grassland (Mixed Grass--Scrub)
0	Scrub Grassland (Sacaton--Scrub)
0	Sonoran Deciduous Swamp and Riparian Scrub (Mixed Scrub)
75,211	Sonoran Desertscrub (Creosotebush--Bursage)
97,887	Sonoran Desertscrub (Paloverde--Mixed Cacti)
18	Sonoran Riparian and Oasis Forest (Cottonwood--Willow)
4,892	Urban
34	Water

Pima County Index Map



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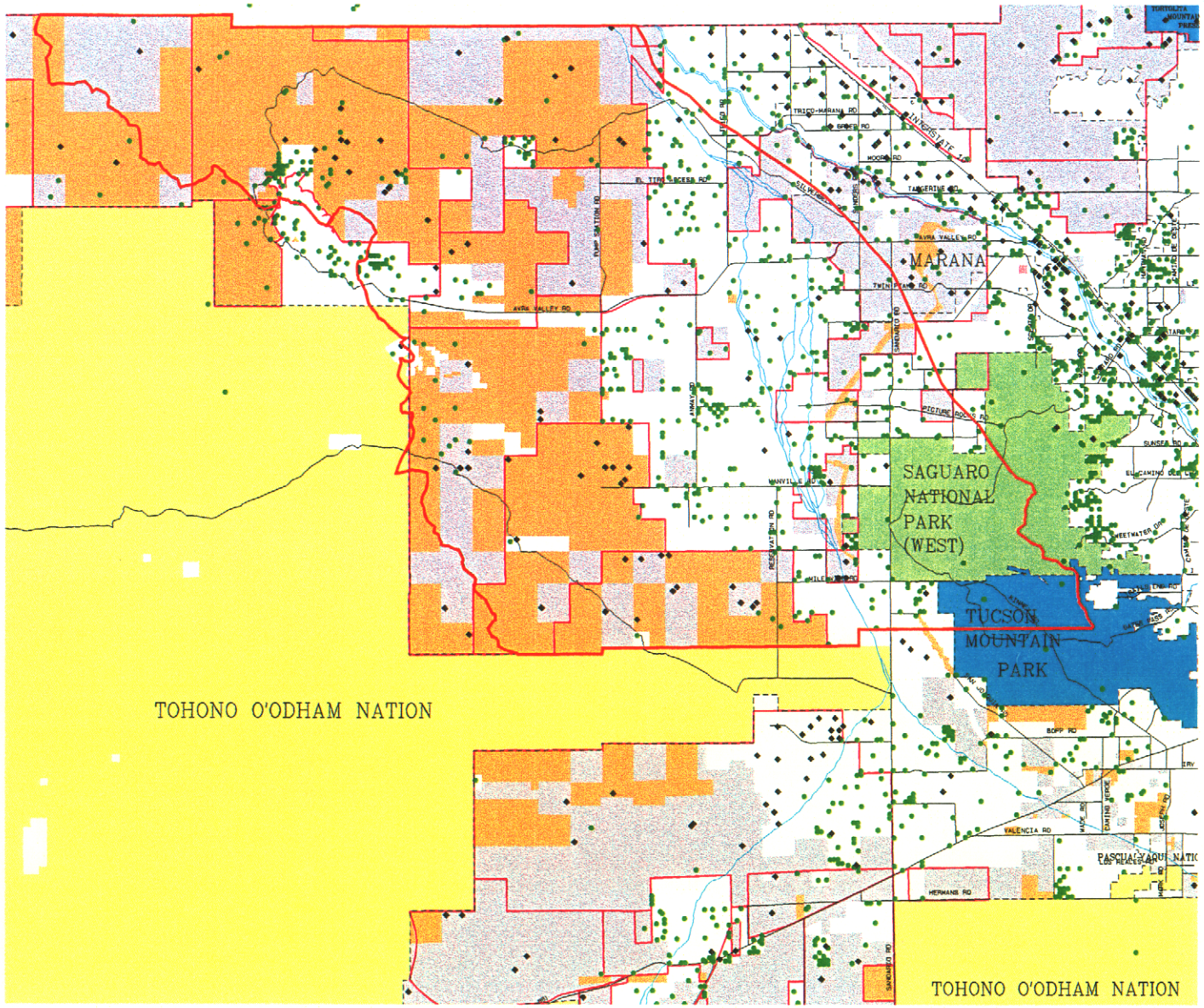
/pydnyvol2/sonora/cultural/esm/pimed/plan6b/covers/ranch_gap6b.aml 4/4/00

Stock Tanks and Well Sites



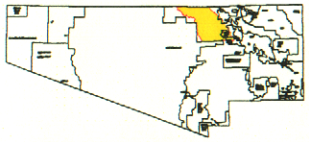
SDCP PLANNING UNIT 6b

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

STATISTICS FOR UNIT 6b

Well Sites:	612
Stock Tanks:	76

Pima County Index Map



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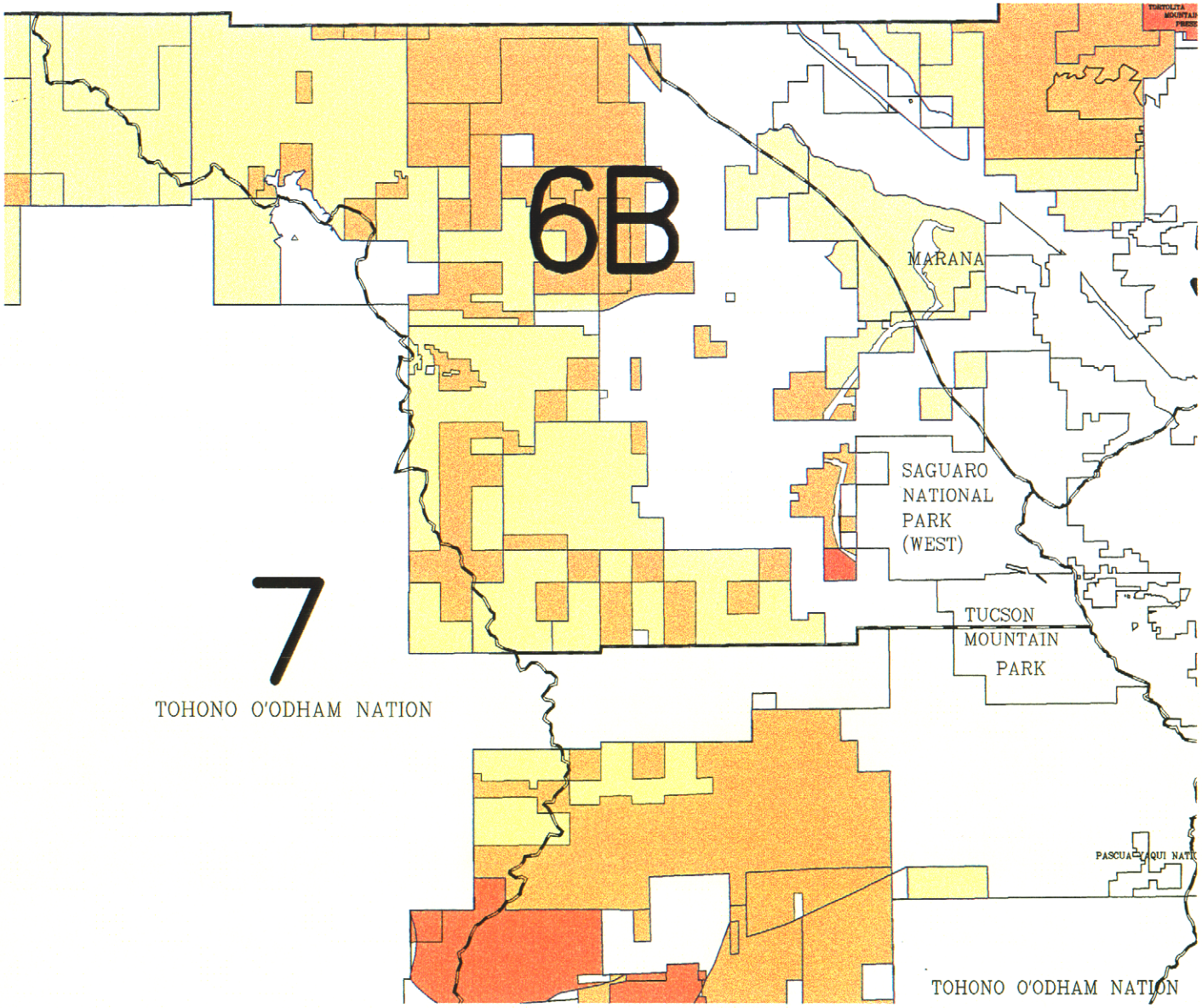
/pysmyovl2/sonora/cultural/asnjoined/plan6b/amls/ranch_tank6b.aml 4/4/00

Carrying Capacity per Square Mile by Grazing Allotment

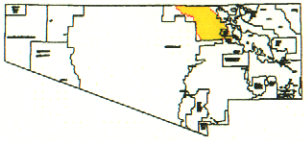
SDCP PLANNING UNIT 6b



- 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

Pima County Index Map



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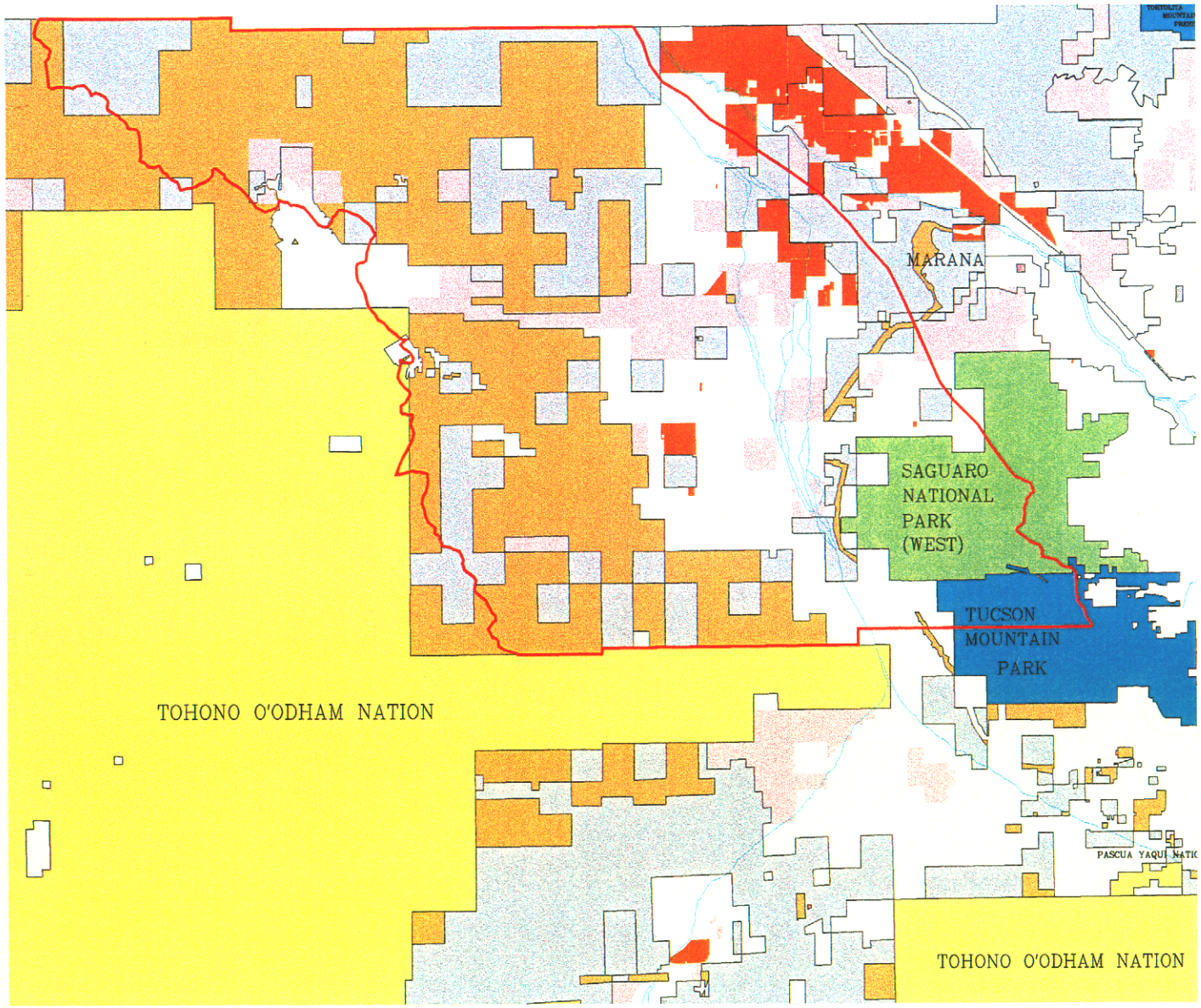
/pygmyow12/sonora/ranch/covers/avra_carry.aml Plotted: 4/4/00

Agricultural Lands



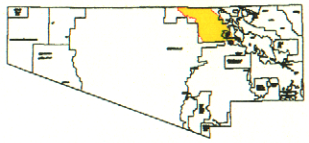
SDCP PLANNING UNIT 6b

- 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

STATISTICS FOR UNIT 6B

ACRES OF AGRICULTURAL LAND: 3,579

Pima County Index Map



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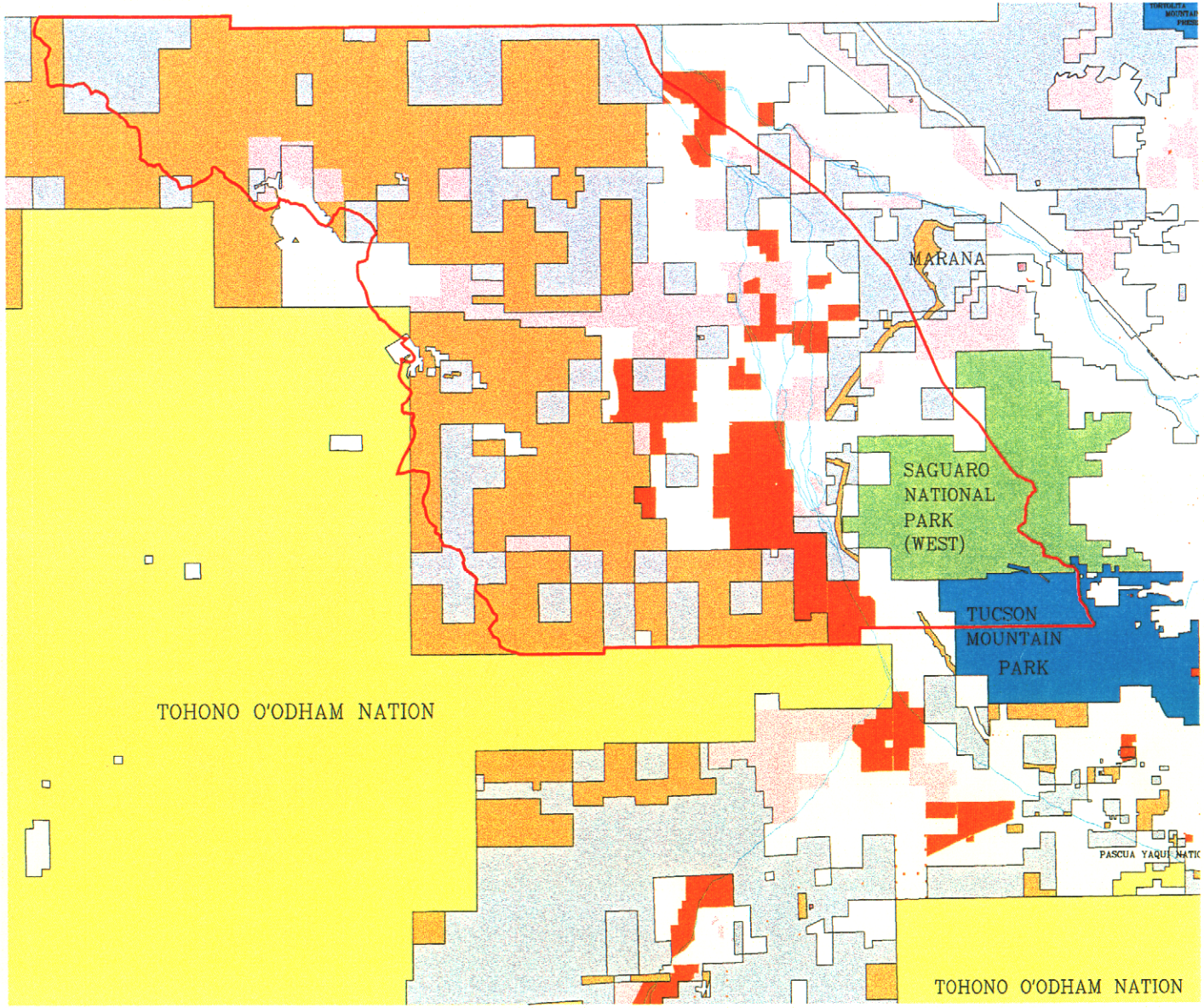
/pygmyowl2/sonora/cultural/asnjoined/plan6b/aals/ranch_ag6b.aml 4/4/00

City of Tucson Owned Parcels



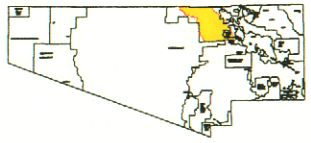
SDCP PLANNING UNIT 6b

- Planning Unit Boundary
- Major Washes
- City of Tucson Parcels
- 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

STATISTICS FOR UNIT 6b

OF CITY OF TUCSON PARCELS: 79
ACRES OF CITY OF TUCSON OWNED LAND: 15,330

Pima County Index Map



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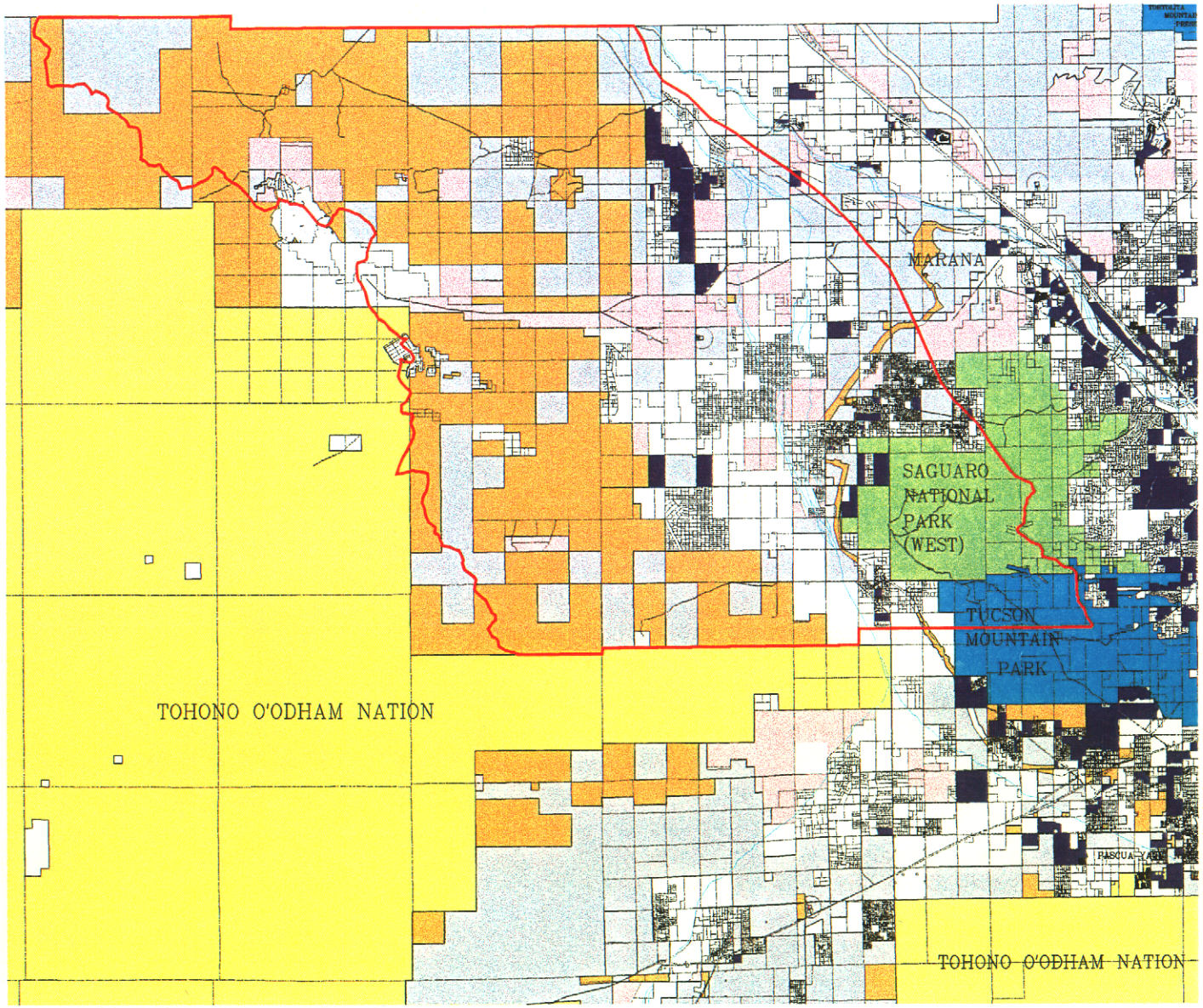
/pygeyow12/sonora/cultural/asmjoined/plan6b/amls/ranch_city6b.aml 4/4/00

Platted Subdivisions



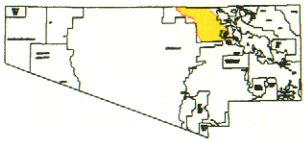
SDCP PLANNING UNIT 6b

- 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

STATISTICS FOR UNIT 6b

NUMBER OF PLATTED SUBDIVISIONS:	40
ACRES OF PLATTED SUBDIVISIONS:	4,469
NUMBER OF PARCELS:	7,900

Pima County Index Map



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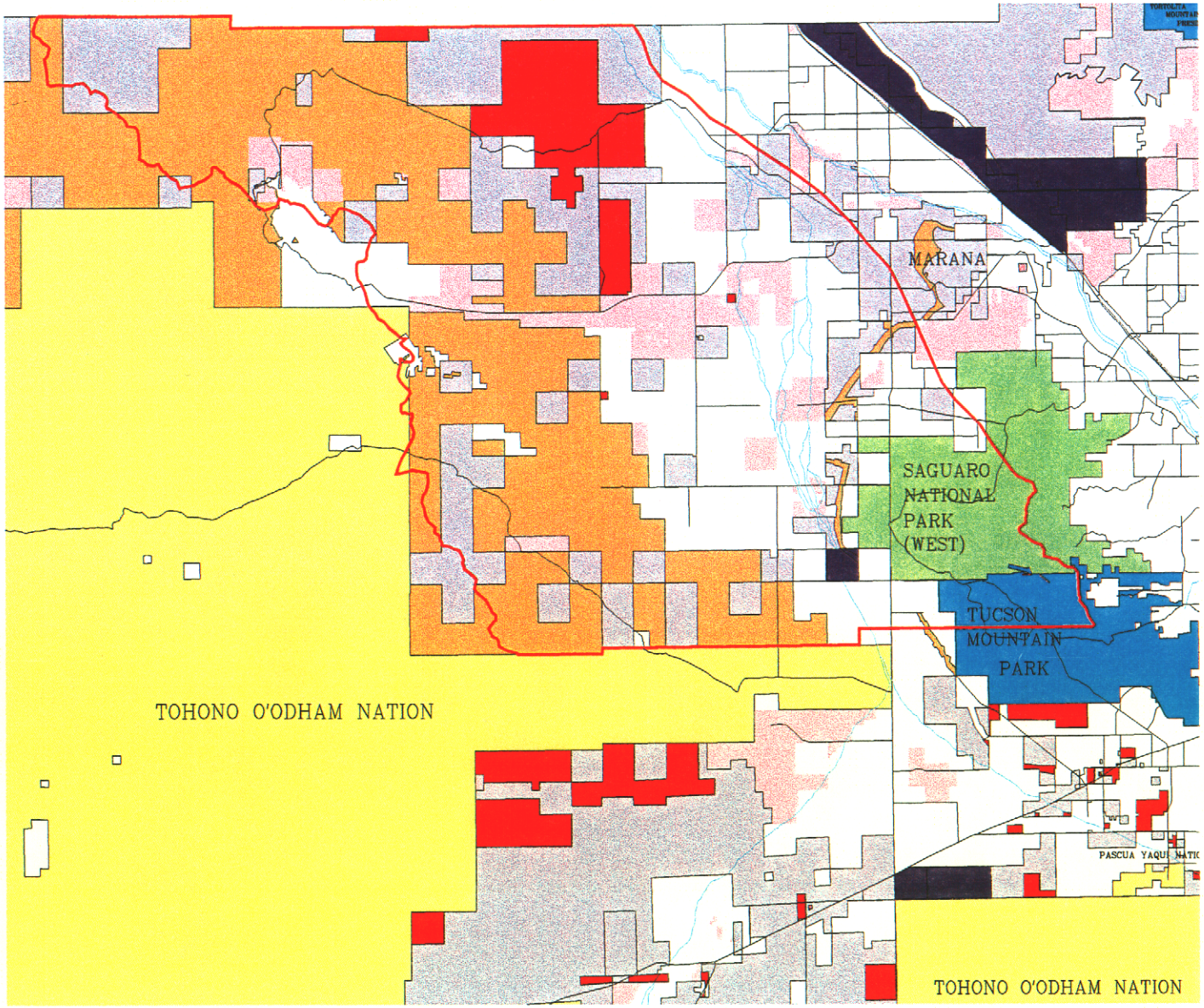
/pvgmyowl2/sonora/cultural/esmjoined/plan6b/emls/ranch_sub6b.aml 4/4/00

Disposable Lands for BLM and State of Arizona



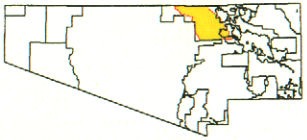
SDCP PLANNING UNIT 6b

- Planning Unit Boundary
- Major Washes
- Disposable BLM Land
- Disposable State Land
- 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

STATISTICS FOR UNIT 6b

DISPOSABLE BLM LAND:	12,639 AC.
DISPOSABLE STATE LAND:	645 AC.

Pima County Index Map



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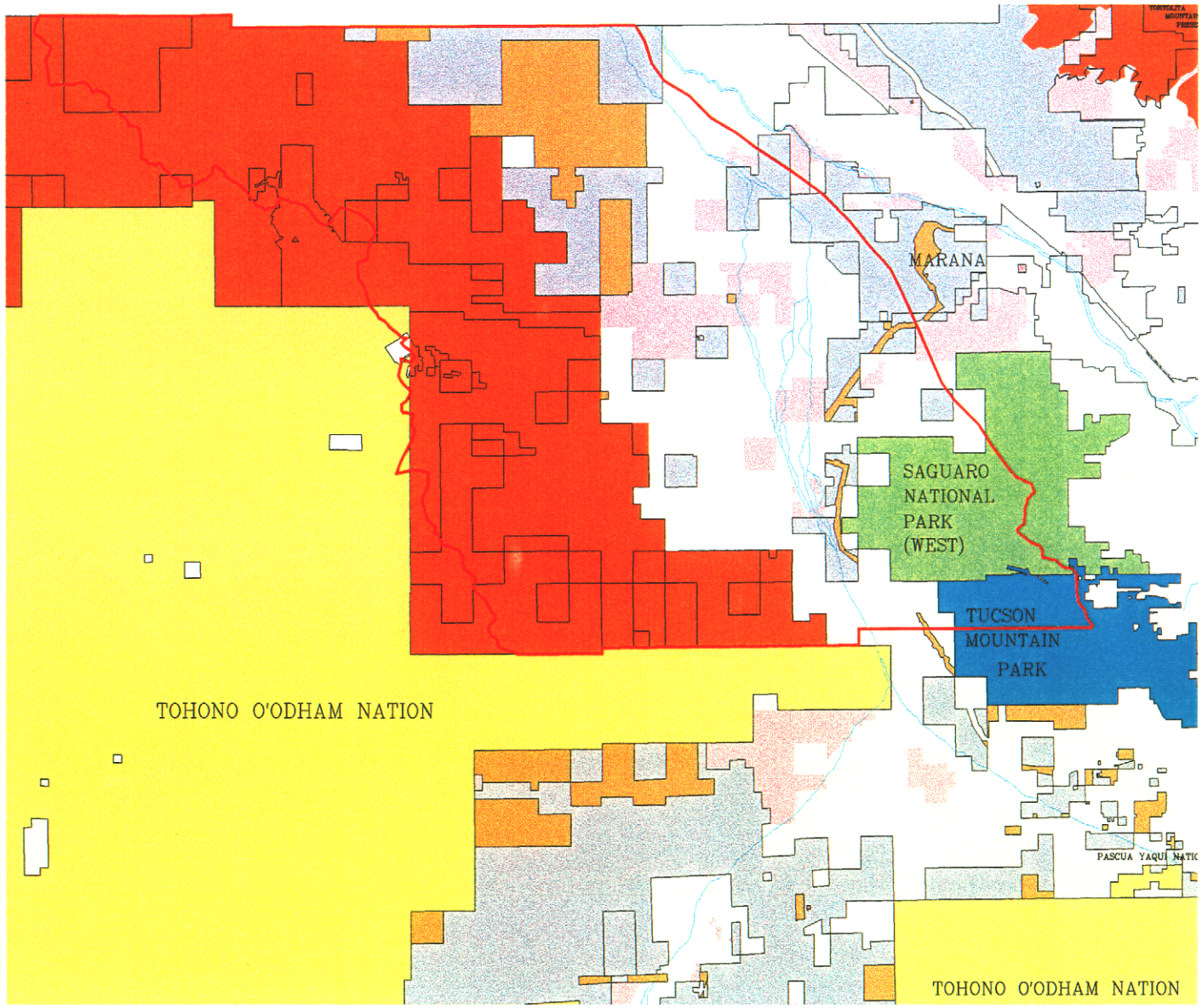
SEAL OF PIMA COUNTY ARIZONA

pygmyowl2/sonora/cultural/esmjoined/plan6b/amls/ranch_disp6b.aml 4/4/00

BLM Long Term Management Lands

SDCP PLANNING UNIT 6b

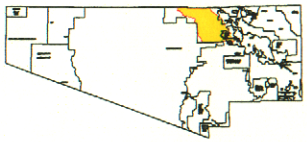


- Planning Unit Boundary
- Major Washes
- BLM Long Term Management Lands
- BLM
- County Park
- Indian Lands
- Military Reservations
- National Forest Lands
- National Parks and Monuments
- National Wildlife Refuge
- Private Lands
- State Lands
- State Park
- Ranch Use

STATISTICS FOR UNIT 6B

ACRES OF BLM LONG TERM MANAGEMENT 102,362

Pima County Index Map



Index Map Scale 1:1,500,000

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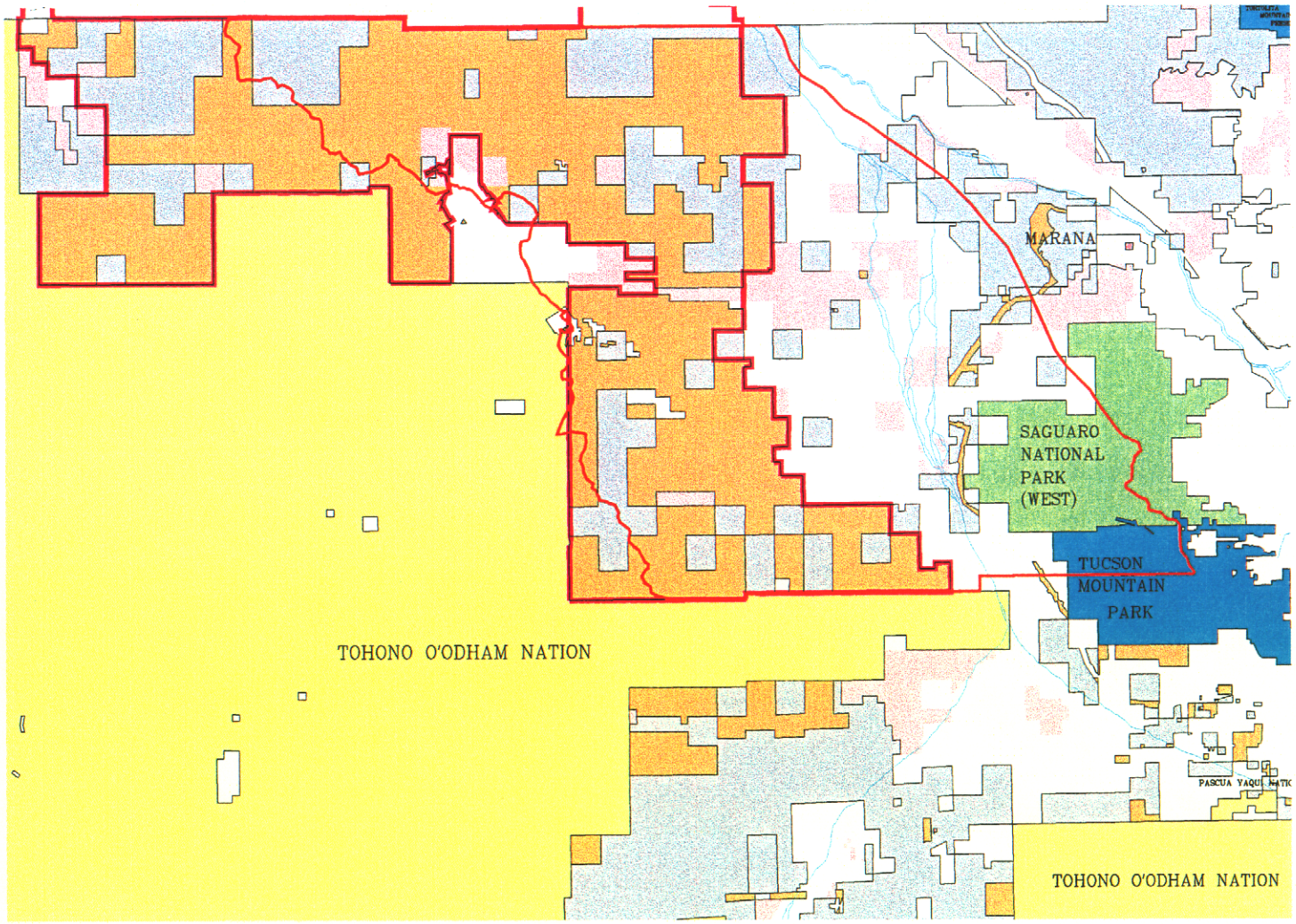
/pyg@myow12/sonora/cultural/asmjoined/plan6b/amls/ranch_acec6b.aml 4/4/00

Ironwood National Monument

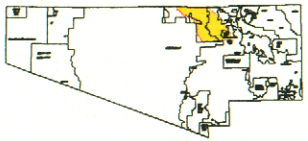
SDCP PLANNING UNIT 6b



- Ironwood National Monument
- Planning Unit Boundary
- 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

Ironwood National Monument Acres: 195,039

Pima County Index Map



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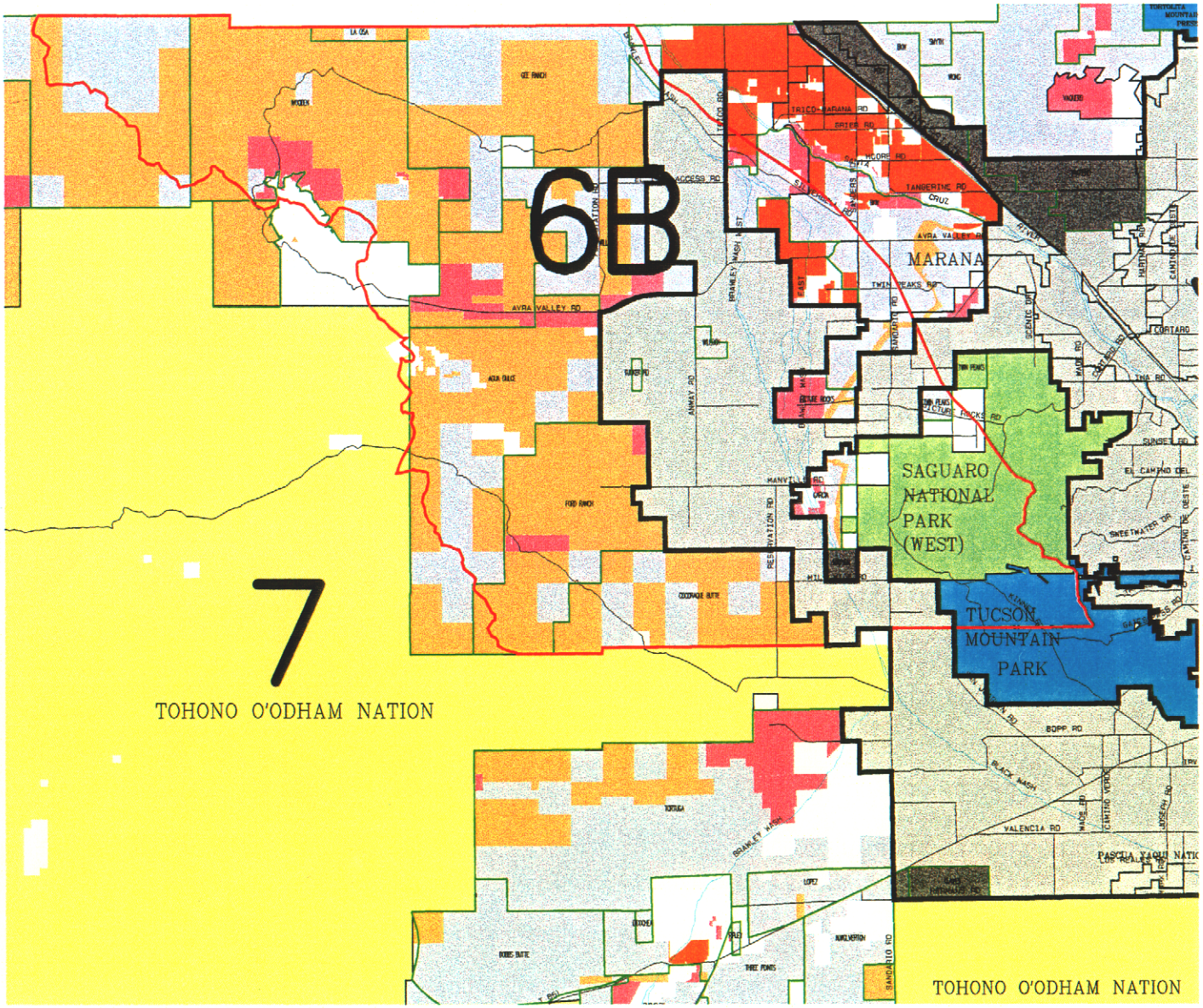
/pygmyowl2/sonora/cultural/asmjoined/plan6b/emls/ironmon.aml 7/17/00

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



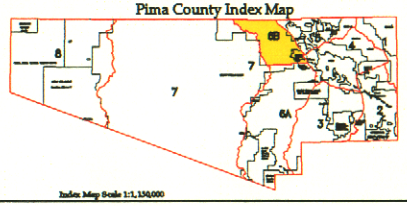
SDCP PLANNING UNIT 6b

- 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 LANDS
- STATE PARK
- RANCH USE
- AGRICULTURAL USE
- Urban Boundary
- ASLD / SLUP's

STATISTICS FOR UNIT 6B

ACRES OF ASLD/SLUP's 645

Pima County Index Map



Index Map Scale 1:1,150,000

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/pygmyowl2/sonora/cultural/sam/pimao/plan6b/amls/urban_bnd6b.amPlotted: 4/4/06

IV-8. Ranching in Western Pima County

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 Town sites.

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 Town sites 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 a 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 supports a variety of environmental zones and vegetation types, western Pima County as a region

exhibits limited vegetation diversity. Because of its lower elevations, much of the subarea is characterized by desert scrub creosote, bursage, paloverde, and saltbush.

Table IV-8.1 Major Vegetation Zones in Western Pima County

▸ Agriculture/Pasture	127 acres	0.0 percent
▸ Urban	5,539	0.0
▸ Mining	2,390	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	3,044	0.0
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 IV-8.2 Natural & Constructed Water Sources in Western Pima County

Springs	Intermit-Streams	Peren-Strms	Stock Tanks	Shallow Grnd-Water	Wells
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 three town sites. 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 IV-8.3 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	83	0.0
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 permitee. 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 fourth 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 the following table and are identified by the name of the grazing lease, and all utilize grazing and ranch management plans under which they implement their grazing leases. 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 IV-8.4 Ranches in Western Pima County

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

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 IV-8.5 Ranch lands in Western Pima County

Land Owner	Ranch/Ag. Use	Non-Ranch Use	Total
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	0	83?	83
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 IV-8.6 Animal Units Allowed to be Grazed in Western Pima County

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

In addition to grazing, federal and state public lands may also 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.

Currently, 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.

Ranch land Conservation Potential:

Because the BLM and State lands used for grazing comprise a relatively 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 ranch lands 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:

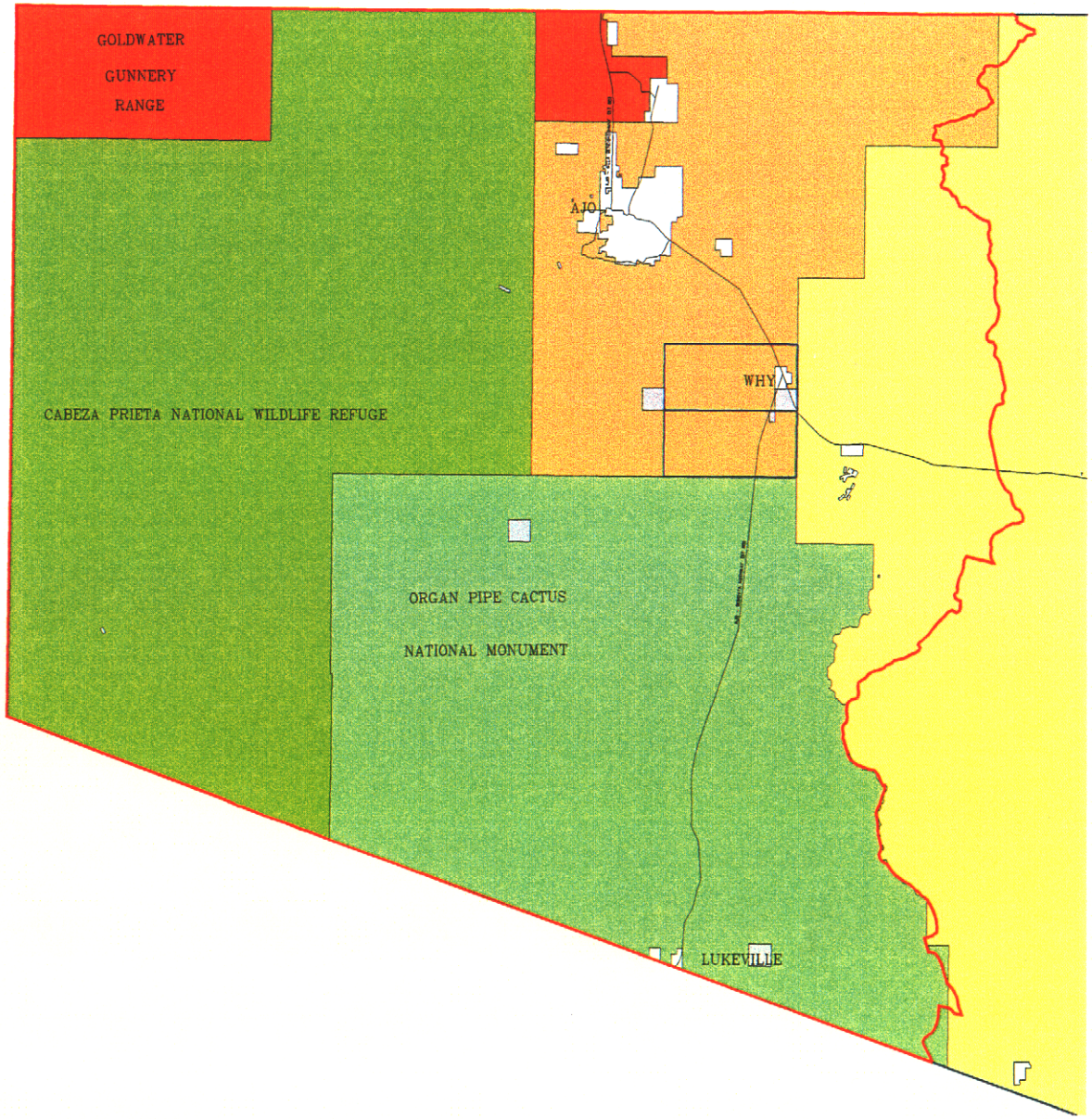
To conclude, the Western Pima County continues to support stable ranching operations that facilitate the connectivity of ranch lands with expansive public preserves. Land use in Western Pima County remains either uninhabited or largely rural. Some 175,573 acres or 274 square miles are used in ranching; 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 western Pima County region, ranch land conservation together with the existing public preserves will achieve important and practical conservation goals that are consistent with the Sonoran Desert Conservation Plan.

Ranch Lands and Grazing Allotments

SDCP PLANNING UNIT 8



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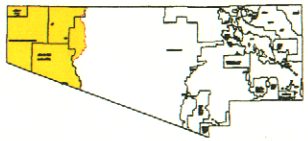
- County Park
- Indian Lands
- Military Reservations
- National Forest Lands
- National Parks and Monuments
- National Wildlife Refuge
- Private Lands
- State Lands
- State Park
- Ranch Use
- Goldwater Gunnery Range

STATISTICS FOR PLANNING UNIT 8

BLM	174,846	AC
GOLDWATER GUNNERY RANGE	58,796	AC
COUNTY PARK	0	AC
MILITARY RESERVATIONS	0	AC
INDIAN LANDS	104,805	AC
NATIONAL FOREST LANDS	0	AC
NATIONAL PARKS AND MONUMENTS	327,107	AC
STATE LANDS	2,672	AC
STATE PARKS	0	AC
PRIVATE LANDS	13,485	AC

Pima County Index Map



Index Map Scale 1:1,500,000

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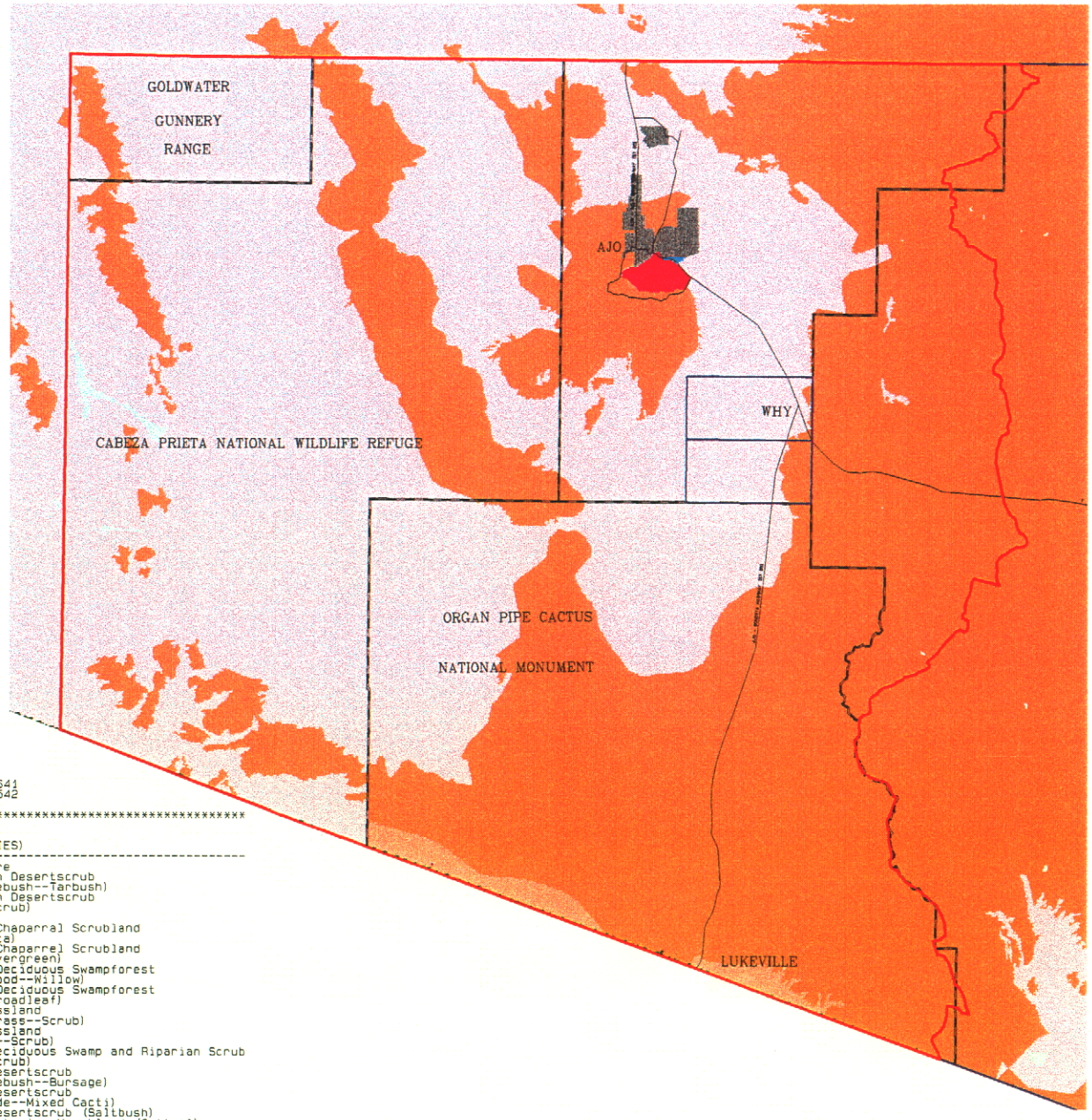
GAP Vegetation and Grazing Allotments

SDCP PLANNING UNIT 8



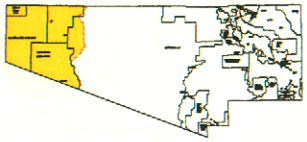
- Watershed Planning Unit Boundary
- Grazing Allotments
- Administrative Boundaries
- Washes
- Agriculture
- Urban
- Mining
- Chihuahuan Desertscrub (Creosotebush--Tarbush)
- Chihuahuan Desertscrub (Mixed Scrub)
- Chihuahuan Desertscrub (Whitethorn)
- Madrean Evergreen Forest (Encinal)
- Madrean Evergreen Forest (Oak--Pine)
- Madrean Montane Conifer Forest (Douglas-Fir--Mixed Conifer)
- Madrean Montane Conifer Forest (Pine)
- Mogollon Chaparral Scrubland (Manzanita)
- Mogollon Chaparral Scrubland (Mixed Evergreen Sclerophyll)
- Mogollon Deciduous Swampforest (Cottonwood--Willow)
- Mogollon Deciduous Swampforest (Mixed Broadleaf)
- Playa
- Scrub Grassland (Mixed Grass--Scrub)
- Scrub Grassland (Sacaton--Scrub)
- Sonoran Deciduous Swamp and Riparian Scrub (Mixed Scrub)
- Sonoran Desertscrub (Creosotebush--Bursage)
- Sonoran Desertscrub (Paloverde--Mixed Cacti)
- Sonoran Desertscrub (Saltbush)
- Sonoran Interior Marshland (Cattail)
- Sonoran Riparian and Oasis Forest (Cottonwood--Willow)
- Unclassified/Mixed
- Water

Minimum Elevation 641
Maximum Elevation 4,542

****
VEGETATION ACREAGE

ACRES	BIOME (SERIES)
127	Agriculture
0	Chihuahuan Desertscrub (Creosotebush--Tarbush)
0	Chihuahuan Desertscrub (Mixed Scrub)
2,390	Mining
0	Mogollon Chaparral Scrubland (Manzanita)
0	Mogollon Chaparral Scrubland (Mixed Evergreen)
0	Mogollon Deciduous Swampforest (Cottonwood--Willow)
0	Mogollon Deciduous Swampforest (Mixed Broadleaf)
0	Scrub Grassland (Mixed Grass--Scrub)
0	Scrub Grassland (Sacaton--Scrub)
0	Sonoran Deciduous Swamp and Riparian Scrub (Mixed Scrub)
542,271	Sonoran Desertscrub (Creosotebush--Bursage)
517,818	Sonoran Desertscrub (Paloverde--Mixed Cacti)
11,084	Sonoran Desertscrub (Saltbush)
2	Sonoran Interior Marshland (Cattail)
6	Sonoran Riparian and Oasis Forest (Cottonwood--Willow)
5,539	Urban
2,020	Water
937	Unclassified

Pima County Index Map



Index Map Scale 1:1,100,000

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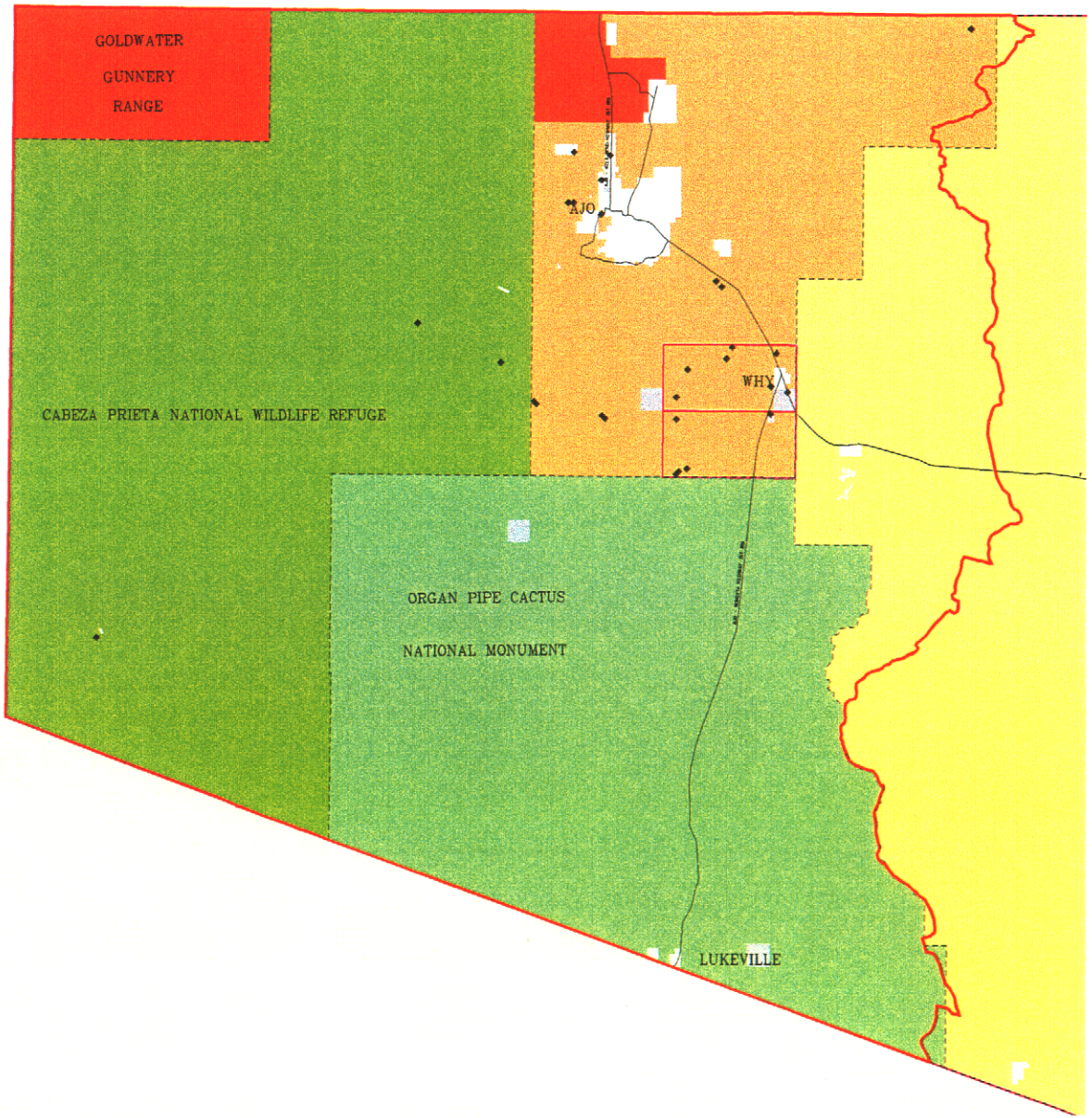
Stock Tanks and Well Sites



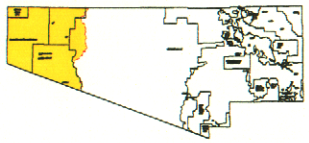
SDCP PLANNING UNIT 8

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

STATISTICS FOR UNIT 8

Well Sites:	0
Stock Tanks:	28

Pima County Index Map



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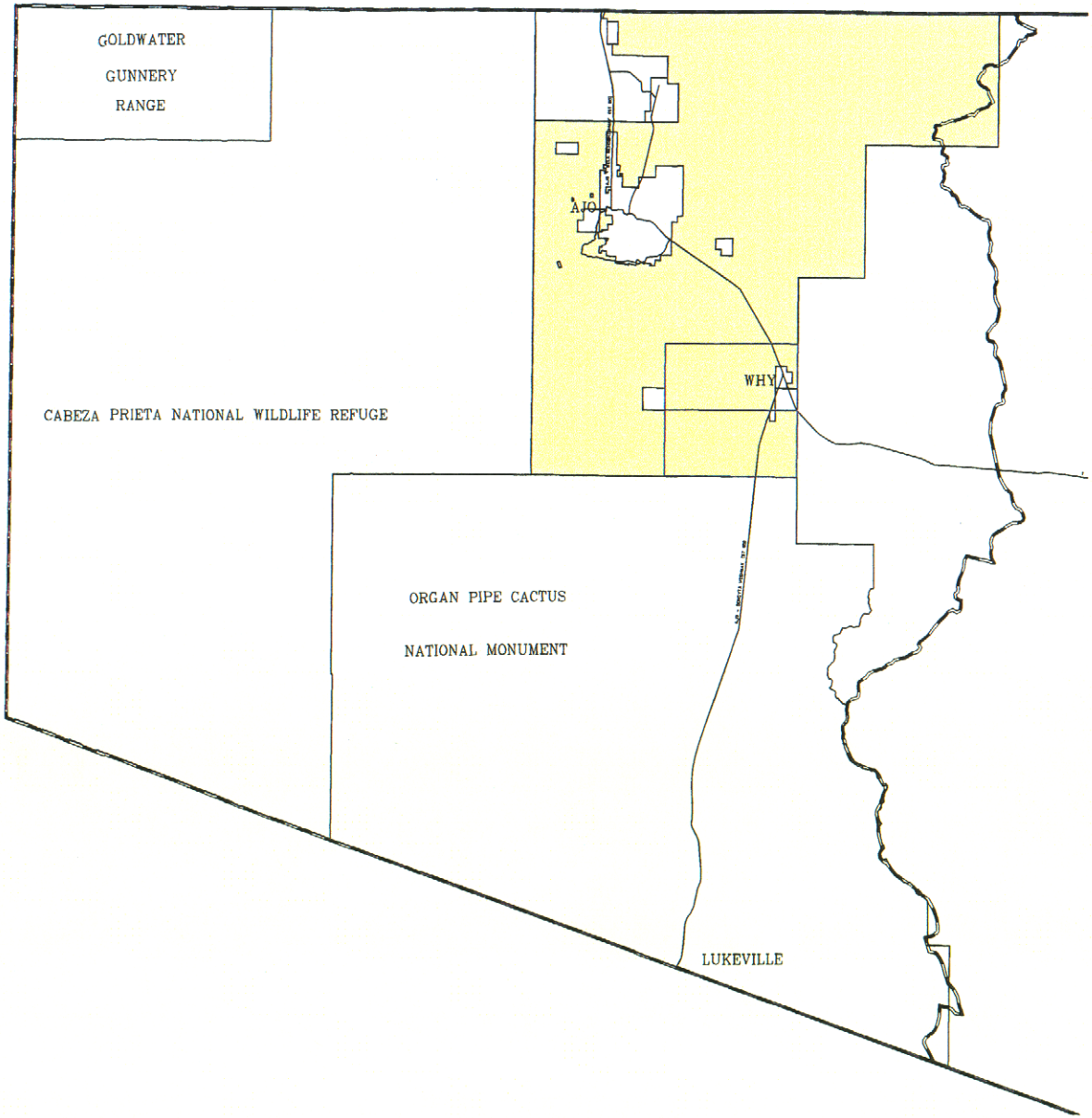
/pycmyow12/sonora/cultural/esmjoined/plan8/aml8/ranch_tank8.aml 5/10/00

Carrying Capacity per Square Mile by Grazing Allotment

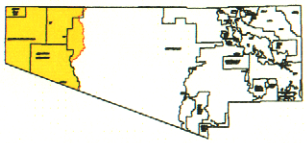
SDCP PLANNING UNIT 8



- 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

Pima County Index Map



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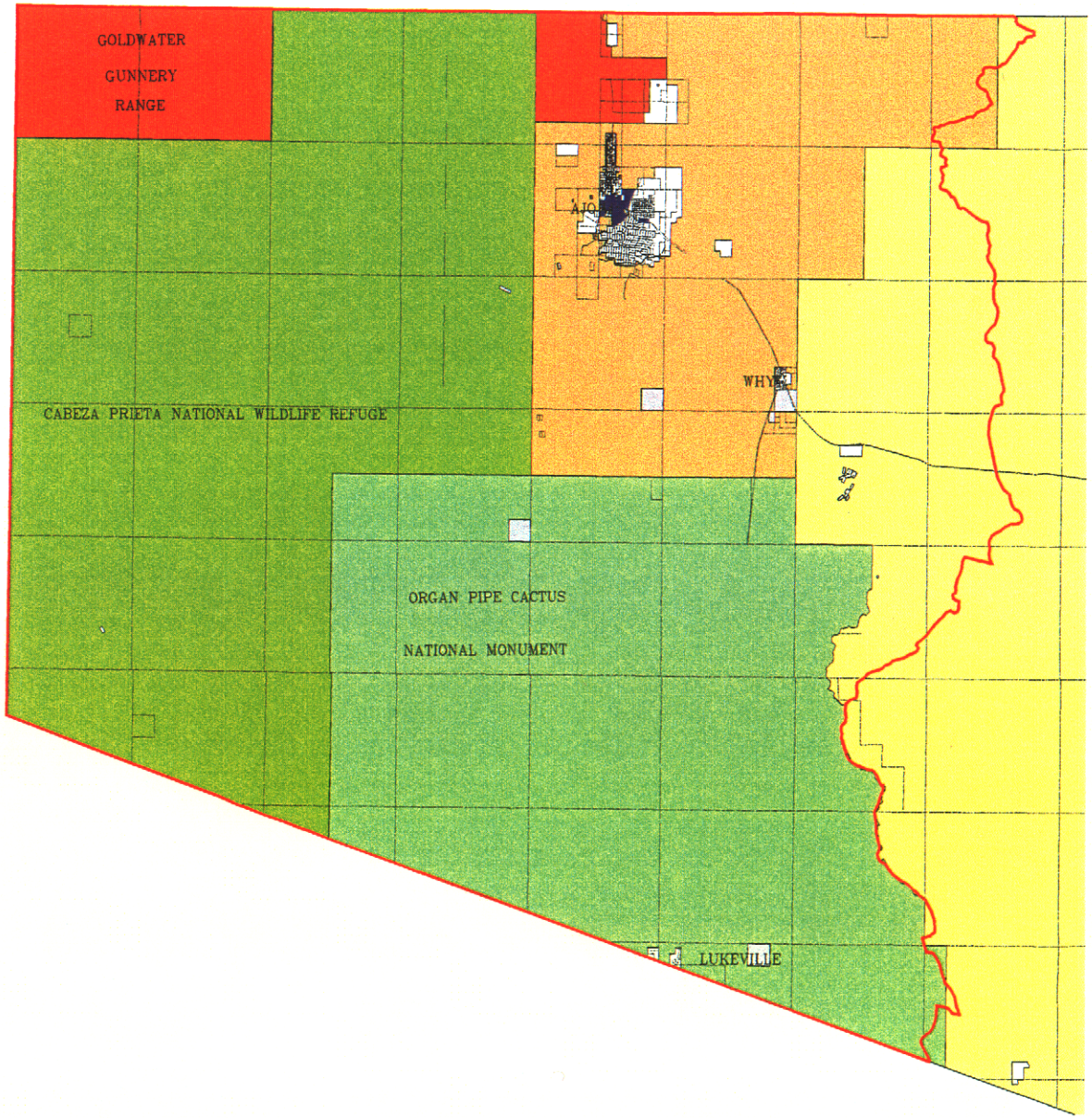
/pygmyowl2/sonora/cultural/esmjoined/plan8/amls/ranch_carry8.aml Plotted: 5/15/00

Platted Subdivisions



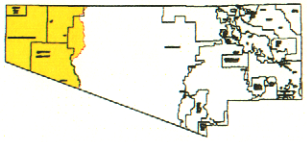
SDCP PLANNING UNIT 8

- 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 Gunnery Range

STATISTICS FOR UNIT 8

NUMBER OF PLATTED SUBDIVISIONS:	34
ACRES OF PLATTED SUBDIVISIONS:	851
NUMBER OF PARCELS:	3,184

Pima County Index Map



Index Map Scale 1:1,500,000

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SEAL OF PIMA COUNTY ARIZONA

/pygmyowl2/sonora/cultural/asmjoined/plan8/aml8/ranch_sub8.aml 5/10/00

V. Extent, Capacity, Threats, and Conservation Potential of Pima County Ranch lands

As one of the six elements of the Sonoran Desert Conservation Plan adopted by the Pima County Board of Supervisors, the value of ranch conservation was acknowledged as an important conservation element in its own right. Moreover, by including ranch lands as a productive "working landscape" worthy of conservation, Pima County formalized its commitment to ranching as an important land use and "to keep ranchers ranching." Implicit in this acknowledgment is the understanding that working ranches and the state and public lands leased for ranching are critical to achieving multiple community and conservation goals:

- unfragmented natural open space and wildlife habitat are preserved
- the metropolitan urban boundary is better defined
- natural and cultural resources are preserved
- water resources and groundwater are conserved
- an important agricultural industry is maintained in the local economy
- ranchers continue to pursue their chosen livelihood
- ranchers continue their important land stewardship role

While livestock ranching has deep historical roots in Pima County dating to the first Spanish explorers and missionaries who brought domestic cattle, horses, sheep, and goats to the Southwest missions in the 16th and 17th centuries, ranching has continued since that time as an assumed but largely "invisible" land use because it is a land-extensive industry and because an increasingly urban and growing population of newcomers in the Tucson metropolitan area simply have no first-hand knowledge of this traditional and deeply rooted local industry.

Unlike cultivated croplands, which most urban dwellers will recognize as agricultural lands, ranch lands are comprised of great expanses of natural open space and have no very obvious or frequent signatures to identify its use as grazing lands, except for the occasional cow, fence, or "open range" road sign. Consequently, there has been little attention focused to date on defining ranch lands and ranching as a land use in the rural areas of Pima County. Planning documents are generally written from an urban and development potential perspective where there are two gross categories of land use – "urban" with development and density classifications, and "ex-urban" or development reserve.

Ranching as a rural land use itself has never before been objectively defined and quantified to accurately characterize it for land use and conservation planning purposes in Pima County. To understand the potential for ranch conservation in the context of the Sonoran Desert Conservation Plan, this section and the following section on *Findings* attempt to answer four basic descriptive questions critical to accurately describing and quantifying this land use in Pima County:

1. What is the extent of ranch lands and ranching?
2. What is the capacity or productivity of ranch lands?
3. What are the threats to ranch lands?
4. What is the potential for ranch conservation in Pima County?

Simple questions sometimes require complex data gathering and complex routes of inquiry. To begin to answer these questions, Pima County GIS data, Assessor records, and additional data gathered from a number of state and federal agencies were compiled as noted in the earlier section on variables considered for the analysis. In compiling and synthesizing these data, the Sonoran Desert Conservation Plan has provided a unique opportunity to shed light on this important rural land use and to understand better how important ranch conservation will be in realizing the full range of conservation planning goals.

V-1. Regional Summary of the Extent of the Ranching Land Base

Extent and Contiguity of Pima County Ranch Lands

As has been noted throughout this report and elsewhere, ranch lands in Pima County are a mosaic of private, State Trust and federal lands. This patchwork of ownership was not designed, but is simply a consequence of the history of land ownership designations beginning with the 1854 Gadsden Purchase, various homesteading laws in effect between 1862 and 1934, the establishment of National Forests, and the Arizona State Enabling Act.

Most larger ranches in southeast Arizona and eastern Pima County are some combination of private lands and leased State Trust, BLM, and/or Forest Service lands that form a single ranch unit, and the private, deeded lands are often the smallest component of the ranch. As a result of the federal homesteading laws in effect at the time, private land could be claimed only in small amounts of 640 acres or less, and could only be conveyed to the claimant through agricultural improvements such as cultivation or construction of irrigation lines. Of course, to meet the requirements of agricultural improvements, homestead claims were established in areas where natural water sources were available or where shallow wells could be dug. Private parcels therefore tend to be scattered throughout the landscape, but are found typically along the major stream channels in each watershed or along the mountain foothills where spring water could be tapped. As a consequence of this history of private land claims, private ranch lands have tended to correspond with the areas of greatest ecological value and environmental sensitivity – at springs, along riparian areas, and along the floodplains of the major streams and rivers.

Public lands not claimed for private homesteads remained in federal ownership and were used for grazing as a public or common resource. These public lands could not be fenced under the open range policies of the time, and ranchers on their scattered homestead parcels were free to use as much open grazing range as they chose to use. It has been noted that there were often informal grazing rules where the owner of one water source on his private land could graze "half-way" to the next private water source; however, there was nothing to prevent cattle from moving from one source to the next and there was no incentive for the rancher to conserve the forage on the range. Instead, ranchers each tended to stock as many animals on the open range as possible. This over-stocking, combined with years of drought at the turn of the 20th century, resulted in the well-known severe degradation of Arizona's rangelands, sometimes called the "tragedy of the commons."

In response to the problems of the open range policies, the first Forest Reserves were established in the 1890s, with the objective of protecting upland forested areas from further

erosion and degradation. The first Forest Reserves were established in southern Arizona beginning in1902, and the first grazing allotments on Forest lands were established in 1907.

Another important land ownership designation was established with Arizona gaining statehood in 1912. Under the terms of the Enabling Act, the State of Arizona was granted four square miles or four sections of land per township for lands to be "held in trust, to be disposed of in whole or in part ..." that is, to maximize the revenues generated from it for the State's beneficiaries. Because many of these sections in each township were already claimed for Forests, and by homesteaders, miners, Indian reservations, and others, the State Land Department was authorized to select *in lieu* sections from the remaining public domain. At the time, prime grazing lands – the upland, grassland valleys of Arizona were considered to be the most valuable lands to be leased for grazing, and consequently the State selected these lands disproportionately, much of this land in southern Arizona.

Uncontrolled grazing on the remaining public lands was ended when the open range policy was changed to a system of allotments or grazing leases, which gave individual ranchers the exclusive right to graze their livestock on lands leased to them. Initially, these allotments were managed by the General Land Office Grazing Service, now the Bureau of Land Management. This allotment system, together with State Trust and Forest leases, and the passage of the Taylor Grazing Act of 1934, brought the open range system to an end, provided incentives to ranchers to improve the productivity of their deeded and leased lands, and established the mosaic of land ownership that characterizes Pima County's ranch lands. The following table provides a simple, regional breakdown of the ownership of ranch lands.

Table V-1.1 Pima County Ranching and Agricultural Land Base

Ownership	Acres in Ranching/Ag. Use	Percent of Total
State Trust Lands	817,541 acres	51%
Private Ranch Lands	209,146	13
Forest Service	254,370	16
BLM	324,153	20
TOTAL	1,605,210 acres	100%

Much of this land remains as unfragmented natural open space used for grazing, with its greatest connectivity or contiguity in the rural upland areas that lie outside the 25 mile radius of the Tucson urban core. Here, ranches and ownership lines are no more than lines on a map, and ranches adjoin each other forming a connected and whole landscape. The valleys with the greatest connectivity of ranch lands include the Altar Valley, Empire-Cienega Valley, the Upper Santa Cruz Valley, and the San Pedro Valley.

Ranches - Private, State Trust, and Federal Lands

Today, approximately 50 percent of Pima County (excluding tribal lands) is dedicated to agricultural use, and about 60 percent of eastern Pima County is today used for ranching and

other agricultural uses. When ownership is analyzed by valley, considerable differences in ownership that affects management and tenure can be noted. The following table provides details of land ownership by subarea.

Table V-1.1 Ranch and Agricultural Land Ownership by Pima County Subarea

	Private	State	BLM	Forest	TOTAL Acres
1. San Pedro Valley	18,667	66,975	0	73,032	158,674
2. Empire-Cienega	31,398	124,184	34,461	53,715	243,758
3. Upper Santa Cruz	57,102	203,305	6,844	41,034	308,285
4. Middle Santa Cruz	3,095	17,918	0	34,000	55,013
5. Tortolita Fan	18,606	42,306	1,183	22,700	84,795
6a. Altar Valley	63,542	314,459	21,431	29,889	429,321
6b. Avra Valley	16,716	47,674	85,388	0	149,778
7. Tohono O'odham	-	-	-	-	-
8. West Pima County	20?	720	174,846	0	175,586
	209,146	817,541	324,153	254,370	1,605,210

To calculate the acreages noted above, data were obtained from State, BLM, and Forest Service grazing lease information, and data for private lands in agricultural use and as ranches were derived from the Pima County Assessor' Office. Under state statute ARS 42-12151, private lands maybe classified as agricultural property for property valuation and tax assessment purposes if certain criteria are met. In this article, "agricultural land" means land that is one or more of the following:

1. Cropland in the aggregate of at least twenty gross acres.
2. An aggregate ten or more gross acres of permanent crops.
3. Grazing land with a minimum carrying capacity of forty animal units and containing an economically feasible number of animal units.
4. Land devoted to high density use for producing commodities.
5. Land devoted to use in processing cotton necessary for marketing.
6. Land devoted to use in processing wine grapes for marketing.

Allowing further definition of agricultural lands is the distinction made between farmland or cropland and grazing land or ranch property. Properties in Pima County have been classified as one or the other, providing the data used in this analysis on these two different kinds of agricultural land uses.

To examine further the extent of ranch lands in Pima County and to provide a basis for comparative assessment of the Sonoran Desert Conservation Plan watershed subareas,

multiple variables were considered. Data for each variable were gathered and then quantified that either directly affect or reflect the extent of ranching and agriculture as a land use. Summary statistics were compiled for the region and for each subarea, and then a comparative assessment was conducted that ranked each subarea by variable. Finally a composite score and rank were calculated for each subarea that indicates those subareas with the highest extent of agricultural land use.

The variables considered include:

- % State Trust and Federal lands
- % ranch and agricultural use of the entire valley
- Number of ranches operating in each valley
- % area of the valley in grasslands
- Number of water sources (springs, stock tanks)
- Maximum livestock capacity by number
- Total acres in cultivation

Important to this analysis is the observation that the higher the percentage of ownership of State Trust and public lands, the higher the likelihood of extensive ranching use and the higher the likelihood of the continuation of ranching use. There is a greater "inertia" for federal lands to remain in ranch use, especially those lands designated as preserves, while state lands and certainly private lands are more easily converted to other uses. While this is an important variable, it was not weighted more heavily than other variables because other factors can equally affect sustainable agricultural land use. For example, the Western Pima County subarea has the very highest percentage of federal and State Trust lands; however, most of these lands are designated as natural preserves that exclude grazing, and much of the western desert areas have a very low capacity for grazing.

The number of ranches and the percent of ranching land use in the valley reflect well the current extent of ranching as a land use. The highest percentage of ranching as a land use occurs in the San Pedro Valley at 91 percent, and the highest number of ranches occurs in the Altar Valley with 31^{+} ranches.

Variables which determine suitability and hence the extent of lands used in ranching reflect the land's carrying capacity or the amount of livestock that the land can sustain. Included in this assessment were the percent of the area in grasslands, the number of water sources, and the maximum number of livestock allowed in the valley by lease or permit. When these variables are considered, the Empire-Cienega Valley has the highest percentage of grassland environment, and the Altar Valley has the greatest number of water sources and the highest capacity by number.

Agricultural Croplands in Pima County

While this factor is considered together with the suite of variables used to determine the extent of agricultural and ranching land use, it is considered here separately because of its historic importance, its significant economic contribution to the entire agricultural industry in Pima County, its rapid conversion to real estate development, and its value for water rights.

First home to prehistoric agriculturalists who constructed sophisticated canal irrigation systems along the floodplains of the perennial reaches of its major streams, eastern Pima County has been continuously occupied by peoples who farmed to meet their subsistence needs and for commercial sale and trade of agricultural products. The Santa Cruz River valley has historically been the focus of this agricultural production and continues to be today.

While estimates of prehistoric and early historic agriculture have not been calculated, the total acreage estimated to have been in production during much of the 20th century is about 60,000 to as many as 88,000 acres, most of it focused along the Santa Cruz River near Green Valley, at San Xavier del Bac, near the confluence of the Rillito and Santa Cruz rivers, and in the Post Farms area near Marana. With the ability to pump ground water for irrigation, large areas of the lower Avra Valley along Brawley Wash were also developed into croplands.

From this estimated high of nearly 88,000 acres in cultivation, eastern Pima County now has about 27,000 acres of agricultural lands remaining in production, a difference of some 61,000 acres. Of these croplands taken out of production, the City of Tucson began an active program of buying agricultural lands and their water rights to ensure a future adequate water supply for the metropolitan area. Many of these so-called City of Tucson "farms" were purchased in the lower Avra Valley, and a few large parcels also occur in the northern Altar Valley. Assessor records indicate that the City may own as many as 47,000 acres of former croplands, most of this now just vacant land. The balance of agricultural lands taken out of production are likely to have been converted to development such as happened in the Green Valley area.

The current estimate of about 27,000 acres of agricultural lands in cultivation is derived from the Pima County Tax Assessor's Office that classifies agricultural uses. Most of these agricultural lands are cultivated for crops, with only a small amount of acreage devoted to irrigated pasture. Also of note is the fact that most of the remaining croplands are classified as "prime agricultural land" by the US Department of Agriculture. Prime farmland as defined by the USDA is the land that is best suited to food, feed, forage, fiber and oilseed crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal expenditure of energy and economic resources, and farming it results in the least damage to the environment.

The majority of these remaining cultivated farmlands occurs near the confluence of the Santa Cruz River and Brawley Wash in the Tortolita Fan with 13,821 acres and in the Avra Valley with 3579 acres, where cotton, grains, and other food crops are grown. The Upper Santa Cruz Valley has 7359 acres in production, most of it in pecan orchards.

Comparative Assessment of the Extent and Distribution of Ranch and Agricultural Lands

In assessing the extent of ranch and agricultural lands in each of the County subareas, seven variables were considered that reflect this characteristic, and a composite score and overall rank were calculated to compare the subareas. Table V-1.3 shows the results of this analysis.

Table V-1.3 Ranked Comparison of Highest Extent of Ranch & Agricultural Land Use

Pima County Valley/ Subarea (Area in Acres/Size)	Ownership: % Federal/ State Land	& Rank	Ranches: Number with leases	& Rank	Ranch Use % Ranch Use -Entire Valley	& Rank	Vegetation % Area in Grasslands	& Rank	Waters: Springs + Tanks	& Rank	Capacity: Max. AUs Allowed	& Rank	Croplands Acres in Cultivation	& Rank	Rank Ranch/ AgUse Overall Rank
1. San Pedro Valley 174,315 ac (272 Sq.Mi.)	85%	2	11	5	91%	1	46%	4	368	4	1917	4	2131	4	4
2. Empire-Cienega 318,535 ac (498 Sq.Mi.)	79%	4	28	2	77%	2	70%	1	642	2	4250	3	60	7	2
3. Upper Santa Cruz 449,684 ac (703 Sq.Mi.)	65%	6	25	3	74%	3	63%	3	551	3	4315	2	7359	2	3
4. Middle Santa Cruz 361,851 ac (565 Sq.Mi.)	46%	8	5	7	15%	8	18%	5	92	5	666	7	222	6	8
5. Tortolita Fan 203,546 ac (318 Sq.Mi.)	50%	7	9	6	42%	6	11%	6	76	6	679	6	13,821	1	6
6a. Altar Valley 713,807 ac (1115 Sq.Mi.)	80%	3	31	1	70%	4	65%	2	864	1	6640	1	556	5	1
6b. Avra Valley 221,404 ac (346 Sq.Mi.)	69%	5	13	4	68%	5	3%	7	76	6	834	5	3579	3	5
8. Western Pima County 1,082,281ac (1691 Sq.Mi.)	99%	1	5	7	26%	7	0%	8	35	7	604	8	0	8	7

As might be expected the rural, upland valleys have the greatest extent and greatest contiguity of unfragmented ranch lands, with the Altar Valley ranked first overall, followed by the Empire-Cienega Valley, the Upper Santa Cruz Valley, and the San Pedro Valley.

The Altar Valley, ranked first in overall extent, currently ranks highest in three categories – in number of ranches, highest in number of water sources, and highest in livestock capacity by number.

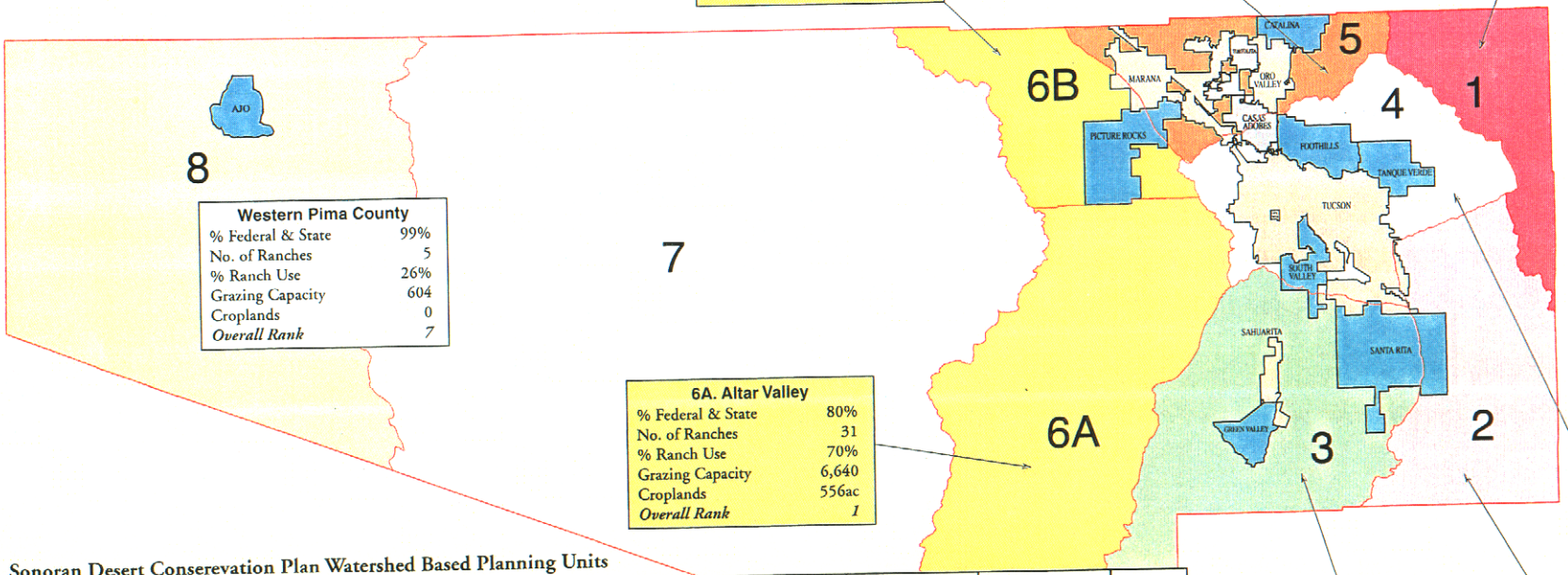
The Empire-Cienega Valley, ranked second overall, ranks highest in percentage area in grasslands, and second highest in three categories – number of ranches, percentage ranch use of the entire valley, and number of water sources.

The Upper Santa Cruz Valley, ranked third overall, ranks second in croplands, livestock capacity by number, and third highest in four categories – number of ranches, percentage ranch use of the entire valley, percentage area in grasslands, and the number of water sources.

The San Pedro Valley, ranked fourth overall, ranks first in percentage ranch use of the entire valley at 91%, second in percentage State Trust and federal land ownership, and fourth highest in four categories – percentage area in grasslands, number of water sources, livestock capacity by number, and croplands.

EXTENT OF RANCHLANDS AT THE WATERSHED LEVEL

Greatest Extent of Ranchlands			
Sub Area	No. of Ranches	% Ranch Use of Valley	% Federal & State Land
Altar Valley	31	70%	80%
Empire Cienega	28	77%	79%
Upper Santa Cruz	25	74%	65%



6B. Avra Valley

% Federal & State	69%
No. of Ranches	13
% Ranch Use	68%
Grazing Capacity	834
Croplands	3,579ac
Overall Rank	*5*

5. Tortolita Fan

% Federal & State	50%
No. of Ranches	9
% Ranch Use	42%
Grazing Capacity	679
Croplands	13,821ac
Overall Rank	*6*

1. Middle San Pedro

% Federal & State	85%
No. of Ranches	11
% Ranch Use	91%
Grazing Capacity	1917
Croplands	2,131ac
Overall Rank	*4*

Western Pima County

% Federal & State	99%
No. of Ranches	5
% Ranch Use	26%
Grazing Capacity	604
Croplands	0
Overall Rank	*7*

6A. Altar Valley

% Federal & State	80%
No. of Ranches	31
% Ranch Use	70%
Grazing Capacity	6,640
Croplands	556ac
Overall Rank	*1*

Pima County Extent of Ranchlands Watershed Comparison

SDCP Planning Units (Watersheds)
Incorporated Areas
Unincorporated Urbanizing Areas
Pending Incorporated Areas

Incorporated Areas
1. Marana
2. Oro Valley
3. Sahuarita
4. South Tucson
5. Tucson
Unincorporated Urbanizing Areas
1. Ajo
2. Arivaca
3. Catalina
4. Foothills
5. Green Valley
6. Picture Rocks
7. Santa Rita
8. South Valley
9. Tanque Verde
Pending Incorporated Areas
1. Casas Adobes
2. Tortolita

N

4. Middle Santa Cruz

% Federal & State	46%
No. of Ranches	5
% Ranch Use	15%
Grazing Capacity	666
Croplands	222ac
Overall Rank	*8*

2. Cienega – Rincon

% Federal & State	79%
No. of Ranches	28
% Ranch Use	77%
Grazing Capacity	4,250
Croplands	60ac
Overall Rank	*2*

3. Upper Santa Cruz

% Federal & State	46%
No. of Ranches	25
% Ranch Use	74%
Grazing Capacity	4,315
Croplands	7,359ac
Overall Rank	*3*

Sonoran Desert Conserevation Plan Watershed Based Planning Units

Area	Total # of Acres	% Private	% State	% Federal	No. of Ranches with Leases	% Ranch Use of Entire Valley	% Grasslands	Grazing Capacity AUs Allowed	Croplands(acres)	Overall Rank
Middle San Pedro	174,314	14.5	38.7	47	11	91	46	1,917	2,131	4
Cienega - Rincon	318,535	22.6	39.3	38	28	77	70	4,250	60	2
Upper Santa Cruz	449,685	34.8	47.3	18	25	74	63	4,315	7,359	3
Middle Santa Cruz	361,852	55.6	5.5	38	5	15	18	666	222	8
Tortolita Fan	203,546	52.3	22.7	25	9	42	11	679	13,821	6
Altar Valley	713,807	20.0	45	35	31	70	65	6,640	556	1
Avra Valley	221,404	31.5	22	46	13	68	3	834	3,579	5
Tohono Nation	2,354,911	0.7	1.3	-	-	-	-	-	-	-
Western Pima County	1,082,282	1.2	.25	99	5	26	0	604	0	7
Pima County Totals	5,880,337							19,905	27,728	
Eastern Pima County Totals	2,443,144							19,301		

The remaining four subareas with a lower amount of ranching have either been affected by urbanization, which has diminished the amount of ranch land use, or in the case of western Pima County, ranch use is limited by both federal preserves that exclude grazing and by the low capacity and harsh environment of the lower elevation desert environment.

V-2. Regional Summary of Livestock Capacity and Productivity

The question of livestock capacity and productivity examines indirectly the current and potential sustainability of ranching as a land use by evaluating both environmental factors that affect grazing capacity like vegetation, rainfall, elevation and land form, and the actual numbers of livestock currently allowed by permit to graze in the different watershed subareas. No attempt was made to define or quantify areas within each watershed for their livestock capacity value, but it is clear that areas of low forage, rough topography, scarcity of water, and existing development are factors that limit livestock capacity and productivity.

To examine more fully the livestock capacity of ranch lands in Pima County and to provide a basis for comparative assessment of the Sonoran Desert Conservation Plan watershed subareas, multiple variables were considered in addition to the obvious permitted numbers of livestock. Data for each variable were gathered and then quantified that either directly affect or reflect livestock capacity. Summary statistics were compiled for the region and for each subarea, and then a comparative assessment was conducted that ranked each subarea by variable. Finally a composite score and rank were calculated for each subarea that indicates those subareas with the highest capacity, productivity, and potential for sustainability.

The variables considered include:

- % area of the valley in grasslands
- Average estimated rainfall for entire valley
- Maximum number of animal units allowed by permit
- Average number of animal units allowed per square mile by permit
- Number of water sources (springs, stock tanks)
- % Ranch use of entire valley

Grasslands

Critical to any assessment of grazing or livestock capacity is the distribution of suitable forage or vegetation types. Pima County's vegetation regime is highly variable, and major vegetation zones may be largely ascribed to elevational differences. These major vegetation zones include desert scrub at the lowest elevations, grasslands, evergreen woodlands, and ponderosa pine and mixed conifer forests at the highest elevations. Riparian areas typically characterize the major stream channels at the valley center. While livestock grazing can occur in all of these zones, the most productive zones for livestock forage are the grasslands zones, which tend to occur between about 3000' to 6000' elevation. Consequently, the percentage area of grasslands as a renewable forage source is an important variable for this assessment. Subareas with the highest percentage of area in grasslands include the Empire-Cienega Valley at 70 percent, the Altar Valley at 65 percent, and the Upper Santa Cruz Valley at 63 percent.

Rainfall

Similarly, rainfall, too, is an important determinant of livestock capacity. Generally, Pima County's climate is considered semi-arid, but like vegetation this factor also tends to vary with elevation with wide estimated variations from as little as 5 inches per year in the western low deserts to as high as 30 inches or more in the highest mountain ranges. Average annual rainfall in eastern Pima County generally increases from low averages in the northwest Avra Valley subarea to higher rainfall averages in the southeastern Empire-Cienega Valley. Subareas with the highest rainfall averages include the San Pedro Valley, the Empire-Cienega Valley, and the Upper Santa Cruz Valley. These valleys have estimated rainfall averages of 13-25 inches.

Water Sources

In addition to forage and rainfall, another important factor in determining capacity is the number of water sources available to livestock and their placement on the range. With the end of the open range policies, range management strategies required fencing for grazing management and the development of water sources so that livestock could more effectively use the available forage located some distance from natural water sources. Because cattle tend not to travel more than 2-3 miles to graze from a water source, much of this effort involved the construction of stock ponds that were strategically placed at suitable intervals to capture rainfall runoff from ephemeral washes. In this way, water was stored for longer-term seasonal use by livestock and wildlife and at intervals that spread cattle throughout the fenced pasture. In some cases, hand-dug wells and drilled wells were additionally constructed to store water in tanks and to run pipelines to water sources in adjacent fenced pastures. By providing reliable water sources throughout the available grazing range, ranchers could disperse cattle resulting in both higher productivity and lower intensity of grazing use around natural water sources such as streams. More than 2700 stock tanks and water sources for livestock and wildlife are recorded with Arizona Department of Water Resources throughout eastern and western Pima County. Subareas with the highest numbers of water sources registered with the ADWR is the Altar Valley with 864, the Empire-Cienega Valley with 642, and the Upper Santa Cruz Valley with 551.

Carrying Capacity

Of course, the most direct reflection of the livestock capacity of any given subarea is the number of animal units allowed by permit that is approved by the BLM, State Land Department or the Forest Service. This may be considered both by the total maximum number of animals allowed and by the average number of animals that can be grazed per square mile per year. This carrying capacity, determined by calculating forage production, is the number of animals that can be grazed while ensuring a sustainable forage supply, protection of the soil, and maintaining vegetative cover. For some grazing regimes, the inventory and monitoring of plants occurs every year, and in other more stable production areas the capacity does not change very often. This capacity rating means that the amount of livestock on a ranch cannot exceed its animal unit rating; however, as noted elsewhere most ranchers do not use the land to its maximum capacity in order to retain forage reserves

and to facilitate upward trends in range health. Where overgrazing depletes the capital value of a ranch for livestock production, upward trends in range health and productivity increases both private and leased land values should the land be sold or leased for ranching use.

Because capacity is so dependent on forage and rainfall, it is not surprising that the Pima County valleys vary significantly as to capacity from only 1-2 head of livestock per square mile in the lowest elevation valleys to as many as16 or more in the most stable grasslands environments.

Overall, Pima County is currently supporting a maximum of about 20,000 head of livestock, not including tribal lands. USDA statistics from 1997 put the county-wide total at 39,000 head. As might be expected and consistent with the rankings for grasslands and rainfall, the valleys with the highest capacity and productivity by both maximum number and highest average per square mile include the Altar Valley, the Empire-Cienega Valley, and the Upper Santa Cruz Valley.

Area Dedicated to Ranching Use

Finally, the variable that perhaps best reflects the ongoing and successful productivity of ranch lands and perhaps the integrity of ranch lands is the determination of how much of the valley is dedicated to ranching use. In the case of this variable, distance from the growing metropolitan urban core is certainly a secondary factor affecting land use. Consequently, one might expect that the Western County area would exhibit the highest ranching use; however, other factors such as its low desert environment, which is certainly the least favorable range land, the minimal amount of private land, and the dedication of most of the federal lands to preserve status actually result in only 26 percent of this subarea dedicated to ranching use.

In contrast, the San Pedro Valley, also removed from the Tucson urban area, has a far greater capacity for ranching use and exhibits the very highest ranching use of any of the subareas at 91 percent. The other high capacity valleys with a high percentage of land dedicated to ranching are the Empire-Cienega at 77 percent, the Upper Santa Cruz at 74 percent, and the Altar Valley at 70 percent. These valleys which are accessible to the urban core are experiencing some conversion of their lands to residential and commercial development. Had these valleys been farther removed from the urban core, it is likely that a higher percentage of land would be dedicated to ranch use.

Comparative Assessment of Livestock Capacity and Productivity

In assessing the livestock capacity of ranch lands in each of the County subareas, six variables were considered that reflect this characteristic, and a composite score and overall rank were calculated to compare the subareas.

As with the question of the extent of ranch lands, it is the rural, upland valleys that have the greatest livestock capacity, productivity, and potential for sustainability with the Empire-Cienega Valley ranked first overall, followed by the Altar Valley, the Upper Santa Cruz Valley, and the San Pedro Valley. Table V-2.1 shows the results of this analysis.

Table V-2.1 Ranked Comparison of Highest Livestock Grazing Capacity by Pima County Subarea

Pima County Valley/ Subarea (Area in Acres/Size)	Vegetation % Area in Grasslands	& Rank	Rainfall: Avg. of Rainfall	& Rank	Livestock: Max. Number AUs Allowed	& Rank	Capacity: Avg. AUs per Sq.Mi.	& Rank	Waters: Springs +Tanks	& Rank	Ranch Use %Ranch Land Use	& Rank	Overall Rank Grazing Rank
1. San Pedro Valley 174,315 ac (272 Sq.Mi.)	46%	4	15-25	1	1917	4	8	4	368	4	91%	1	4
2. Empire-Cienega 318,535 ac (498 Sq.Mi.)	70%	1	15-23	2	4250	3	11	1	642	2	77%	2	1
3. Upper Santa Cruz 449,684 ac (703 Sq.Mi.)	63%	3	13-23	3	4315	2	9	3	551	3	74%	3	3
4. Middle Santa Cruz 361,851 ac (565 Sq.Mi.)	18%	5	11-19	4	666	7	8	4	92	5	15%	8	5
5. Tortolita Fan 203,546 ac (318 Sq.Mi.)	11%	6	9-17	5	679	6	5	5	76	6	42%	6	6
6a. Altar Valley 713,807 ac (1115 Sq.Mi.)	65%	2	11-19	4	6640	1	10	2	864	1	70%	4	2
6b. Avra Valley 221,404 ac (346 Sq.Mi.)	03%	7	9-11	6	834	5	4	6	76	6	68%	5	7
8. Western Pima County 1,082,281ac (1691Sq.Mi.)	00%	8	5-11	7	604	8	2	7	35	7	26%	7	8

In this analysis, the Empire- Cienega Valley, ranked first in overall extent, currently ranks highest in two categories – in highest percentage of grasslands at 70 percent and in highest average livestock capacity at 11 animals per square mile, and second highest in three categories – highest average rainfall, number of water sources, and percentage of ranch use at 77 percent.

The Altar Valley, ranked second overall, ranks highest in maximum number of livestock by number at 6640 head and highest in number of water sources at 864, and second highest in two categories – percentage area in grasslands at 65 percent and in average livestock capacity at 10 animals per square mile.

The Upper Santa Cruz Valley, ranked third overall, ranks second in livestock capacity by number at 4315 head, and third highest in four categories – percentage ranch use of the entire valley, percentage area in grasslands, average livestock capacity at 9 animals per square mile, and the number of water sources at 551.

The San Pedro Valley, ranked fourth overall, ranks first in percentage ranch use of the entire valley at 91% and rainfall, and fourth highest in four categories – percentage area in grasslands, number of water sources, livestock capacity by number at 1971, and average livestock capacity at 8 animals per square mile.

The remaining four subareas with a lower amount of livestock have either been affected by urbanization, which has diminished the amount of productive ranch land use, or in the case of western Pima County, capacity is limited by both federal preserves that exclude grazing and by the harsh environment of the lower elevation desert environment.

V-3. Regional Summary of the Threats to the Ranching Land Base

As has been noted elsewhere, the greatest threats to the ranching land base are factors directly and indirectly related to significant population growth and development in the greater Tucson metropolitan area and the patterns that this growth takes. Much of the suburban growth to accommodate the huge influx of population in the period from about 1960 to the 1990s has been in the form of regulated or platted subdivisions. To date, there are more than 4700 platted subdivisions in eastern Pima County, and this kind of regulated development accounts for more than 160,000 acres of urban and suburban land use, much of it contained in and adjacent to the incorporated limits of the City of Tucson, Oro Valley, and Marana, and in the Green Valley area of Pima County.

In addition to regulated development, lot-splitting or wild- cat development is unfortunately becoming more prevalent in the areas outside the metropolitan area. This kind of development fragments the natural landscape, further contributes to sprawl, often devalues property, and can create significant hardships for its residents. This kind of development is generally defined as the proliferation of new residential parcels without the benefit of subdivision regulation, which ensures certain standards for public health and safety are met. In 1997, a total of 3729 new residential dwelling units received permits in unincorporated Pima County and fully 41 percent of the new units were not part of platted subdivisions.

Many of these lot split building sites occur in areas formerly used for agricultural uses that are in reasonable driving proximity to the metropolitan core and in areas where land values are increasing. With the increase in agricultural land values more than doubling since 1992 according to USDA statistics, land once valued for its natural productivity is now being valued for its potential for development. While the USDA also notes that agricultural productivity has increased, attesting to the better management of the land by ranchers and farmers alike, this healthy increase in the value of agricultural products sold is far out-stripped by the increase in land values. When this differential in land values becomes sufficiently attractive, ranch lands are sold and converted for real estate development.

As a consequence of these factors threatening the land base for ranching, a set of seven variables was selected and quantified to attempt to address where this conversion was most likely to occur and which subareas were more vulnerable. These variables include:

- % area of the valley privately owned
- Proximity to the urban boundary
- Average cash value per acre
- % area of the valley with Rural Homestead (RH) zoning
- Fragmentation and number of subdivided parcels
- ASLD and BLM lands for disposal
- % private land not used in ranching

Private Lands

Because private lands are more frequently and more easily converted for real estate development, the total percentage of private lands in each subarea was calculated as an

important factor in assessing threats to ranch lands. Conversely, the higher the percentage of Federal and State Trust lands, the generally lower the potential for conversion of ranch lands. As might be expected, the Middle Santa Cruz Valley has the highest percentage of private lands at 54 percent, followed by the Tortolita Fan at 50 percent, the Upper Santa Cruz Valley at 35 percent, and the Avra Valley at 31 percent. Each of these subareas is either within the urban core or experiencing significant growth and urbanization. The remaining four subareas with lower amounts of private land also have the lowest population densities and the fewest areas of ranch land conversion.

Proximity to the Urban Boundary

This variable, too, is a significant factor is assessing where ranch lands are vulnerable to conversion. It stands to reason that access to the urban core from major transportation corridors and proximity to areas already experiencing growth and urbanization will result in nearby lands being more highly valued for their development potential because of their closer proximity to existing infrastructure.

In examining this factor, two kinds of "proximity" were reviewed – accessibility to the urban area from transportation corridors and the status of lands within a 25 mile radius of the intersection of Interstates 10 and 19. In the evaluation of general proximity from transportation routes, four classifications were used – the urban core, accessible to the urban area, not easily accessible, and distant from the urban area. Each subarea was ranked with the Middle Santa Cruz Valley most accessible to the urban core, followed by the Tortolita Fan, the Avra Valley and the Upper Santa Cruz Valley. Obviously, Western Pima County is the most distant.

In addition to these rankings, the status of land located within a 25 mile radius of the urban core was also examined and is quite revealing as shown on the attached figure. Within the radius, fragmentation of ranch lands and open space was greatest, with the highest amounts of private lands not used for ranching purposes, the highest number of subdivided and lot split parcels, and the greatest acreage of State Trust Land reclassified for commercial sale or lease. While not researched, this evident edge where private ranch lands are being converted to real estate development probably also marks the point where land values have become sufficiently high that this is now an attractive alternative to agricultural uses.

Contained within this 25 mile radius is the entire urban area of the Middle Santa Cruz valley, nearly all of the Tortolita Fan including Marana and its current agricultural lands, Oro Valley, and Saddlebrook in Pinal County, the eastern developing portions of the Avra Valley, the northeastern portion of the Altar Valley west to Robles Junction or Three Points, the northen half of the Upper Santa Cruz Valley south to Green Valley, and the northwestern developing portion of the Empire-Cienega Valley that includes the Rincon Creek area and the Rocking K and Vail area suburban areas. In general land within the 25 mile radius represents reasonable driving or commuting time to the urban area, where land values are increasing, and the point where most private ranch lands are transitioning to real estate development. Clearly, it is the remaining ranch lands in this radius that are among the lands most susceptible to development.

Land Values

While it was not within the scope of this assessment to conduct a detailed market analysis of all property values in Pima County to define which parcels are rapidly increasing in value, average cash values were calculated at the watershed or subarea level to show the range of full cash values for land as determined from Assessor records. Clearly, those lands with the highest assessed values will be those lands most likely to be sold for development purposes. With this variable, the Middle Santa Cruz is highest at $68,000 per acre, followed by the Tortolita Fan at $25,000 per acre. There is a significant drop to the Upper Santa Cruz at $4000 per acre, followed by the Avra Valley at $2000 per acre, the Empire Cienega Valley at $1500 per acre, the Altar Valley at $1300 per acre, the San Pedro at $782 per acre, and Western Pima County at $222 per acre.

Rural Homestead Zoning

Other than the designation of Institutional Reserve, the Pima County Rural Homestead zoning classification is currently the lowest density rural zoning at one house per 4.1 acres. Because higher density zoning implies higher land values and higher vulnerability for sale and development, this variable was used as an expression of this higher value and vulnerability. The lower the percentage of RH zoning - the higher the land values and the higher the likelihood of sale and development. In this analysis, RH zoning was generally consistent with the rankings of land values for the more urbanized subareas. The Middle Santa Cruz had no RH zoning, followed by Western Pima County at 65 percent, the Tortolita Fan at 83 percent, the Avra Valley at 84 percent, the Empire-Cienega Valley at 88 percent, the Upper Santa Cruz Valley at 92 percent, the Altar Valley at 94 percent, and the San Pedro Valley at 100 percent.

State Trust and BLM Lands for Disposal

It has been reported elsewhere that some 16 current ASLD Special Land Use Permits (SLUPs) totaling more than 50,000 acres have been identified for commercial sale or lease. While these are currently used as five year grazing permits, there is no ability for ranchers to make improvements on this land, nor is there any incentive for the rancher to increase its natural forage productivity because it has already been reclassified for conversion to development. Interestingly, most of this land occurs within the 25 mile radius of the Tucson urban core and along the major transportation corridors.

In addition, the BLM has also identified certain parcels for disposal, sale or trade. These parcels, unlike the State Trust Lands, tend to be scattered throughout the county in non-contiguous small parcels that lie outside other BLM lands identified for long term management. The majority of these BLM lands for sale occurs within the 25 mile radius and some occur near growing settlements like Arivaca and elsewhere. With the establishment of the Ironwood National Monument, Avra Valley ranch lands are actually more secure now than before. Some 12,000 BLM acres once identified for disposal are now included in the Monument with ranchers retaining their grazing leases. While this has resulted in significant conservation of BLM ranch lands, the remaining disposable BLM lands in the aggregate still comprise some 28,000 acres. When this is added to the 53,000 acres of ASLD lands for

disposal and the interspersed private parcels that are adjacent to these State and BLM disposable lands, approximately some 88,000 acres become available for conversion.

When ranked, the greatest amounts of land for disposal, sale, or commercial lease occur in the Upper Santa Cruz Valley followed by the Middle Santa Cruz, Tortolita Fan, and the Empire-Cienega Valley. The more rural subareas have significantly fewer State or BLM lands for disposal, and the San Pedro Valley has none.

Private Lands Not Used in Ranching

Because most sustainable ranching operations tend to be comprised of a core of private deeded lands, often the original homestead claims, and adjacent leased State and public lands, the degree to which private lands have already been converted to other uses was thought to be a good indicator of future trends and the overall susceptibility of remaining ranch lands to be sold or subdivided. In addition to the amount of private land in each subarea, Assessor records were analyzed to determine what portion of private land was classified as ranch or agricultural property and what portion of all private lands was classified for non-agricultural uses. This, too, is a revealing exercise. Where private land is extremely limited as in Western Pima County, virtually all of it was used for residential purposes and most of it was located in Ajo or Lukeville. Here, ranchers probably live in town and simply lease public lands for grazing purposes without a homesteaded ranch headquarters per se. Except for this somewhat anomalous situation in Western Pima County, the highest percentage of private lands not used in ranching include the Middle Santa Cruz at 98 percent, followed by the Tortolita Fan at 82 percent, Avra Valley at 76 percent, and the Upper Santa Cruz Valley at 64 percent.

The other subareas reflected relatively high percentages of private lands used in ranching revealing these to be somewhat less susceptible to sale and subdivision. However, as was noted in the earlier section on proximity to the urban boundary, the majority of private lands that have been converted to other non-agricultural uses occurs within the 25 mile radius of Tucson in every subarea in eastern Pima County. When ranked, the subareas from most to least fragmented by this radius include the Middle Santa Cruz, the Upper Santa Cruz, the Tortolita Fan, the Altar Valley, the Avra Valley, the Empire-Cienega Valley, and the San Pedro Valley.

Comparative Assessment of Threats to the Ranching Land Base

In assessing threats to ranch lands in each of the County subareas, seven variables were considered that reflect this characteristic, and a composite score and overall rank were calculated to compare the subareas. Again, as might be expected, it is private lands and public and State Trust grazing lands in the urban core and in the urbanizing areas within 25 miles of the urban core that appear to be most vulnerable to sale and subdivision. Ranked, the lands with the highest threats include the Middle Santa Cruz Valley, the Tortolita Fan, the Upper Santa Cruz Valley, the Avra Valley, the Empire-Cienega Valley, the Altar Valley, Western Pima County, and the San Pedro Valley. Table V-3.1 shows the results of this analysis.

Table V-3.1 Ranked Comparison of Highest Threats to Ranching Land Use

Pima County Valley or Subarea (Area in Acres/Size)	Ownership % Private Lands & Rank	Proximity Urban* Boundary & Rank	LandValue: CashValue/ Acre & Rank	Zoning % RH zoning & Rank	Fragment Subdivide parcels & Rank	SLUPs: ASLD acres & Rank	Private % Land No Ranch & Rank	Rank Overall Threat Rank
1. San Pedro Valley 174,315 ac (272 Sq.Mi.)	15% 7	3.0 5	$ 782 7	100% 8	598 8	0 8	28% 8	8
2. Empire-Cienega Valley 318,535 ac (498 Sq.Mi.)	21% 5	2.5 4	$ 1500 5	88% 5	5704 6	7817 4	52% 7	5
3. Upper Santa Cruz 449,684 ac (703 Sq.Mi.)	35% 3	2.0 3	$ 4000 3	92% 6	28,127 3	49,075 1	64% 5	3
4. Middle Santa Cruz 361,851 ac (565 Sq.Mi.)	54% 1	1.0 1	$68,000 1	0% 1	217,093 1	17,919 2	98% 2	1
5. Tortolita Fan 203,546 ac (318 Sq.Mi.)	50% 2	1.5 2	$25,000 2	83% 3	48,863 2	11,101 3	82% 3	2
6a. Altar Valley 713,807ac (1115Sq.Mi.)	20% 6	2.5 4	$ 1300 6	94% 7	22,037 4	1981 5	56% 6	6
6b. Avra Valley 221,404 ac (346 Sq.Mi.)	31% 4	2.0 3	$ 2000 4	84% 4	7900 5	645 6	76% 4	4
8. Western Pima Co. 1,082,281ac (1691SqMi	1% 8	4.0 6	$ 222 8	65% 2	3184 7	640 7	99% 1	7

* Urban Boundary Proximity: 1 = urban area; 2 = accessible; 3 = not easily accessible; 4 = distant from urban area

The Middle Santa Cruz Valley, ranked first in overall susceptibility to development, is shown to rank highest in five categories – highest percentage of private lands at 54 percent, closest to the urban core, highest average land value per acre at $68,000, least RH zoning, highest number of subdivided parcels, and second highest in two categories – highest acreage of disposable lands, and highest percentage of private lands not used in ranching.

The Tortolita Fan, ranked second overall in development potential, also ranks second in percentage of private land, proximity to the urban core, land values, and numbers of subdivided parcels, and third highest in two categories – lowest RH zoning and highest percentage area of private lands not used in ranching.

The Upper Santa Cruz Valley, ranked third overall in development potential, with the highest acreage of disposable lands, and ranks third in four variables – percentage of private lands, proximity to the urban core, land values, and number of subdivided parcels.

The Avra Valley, ranked fourth overall in development potential, ranks third in proximity to the urban boundary and fourth highest in four categories – percentage of private lands, land values, lowest RH zoning, and percentage of private land not used in ranching.

The remaining four subareas exhibited lower overall threats to the conversion of the ranching land base to other uses, with the exception of those portions of these subarea that fall into the 25 mile radius of the urban core.

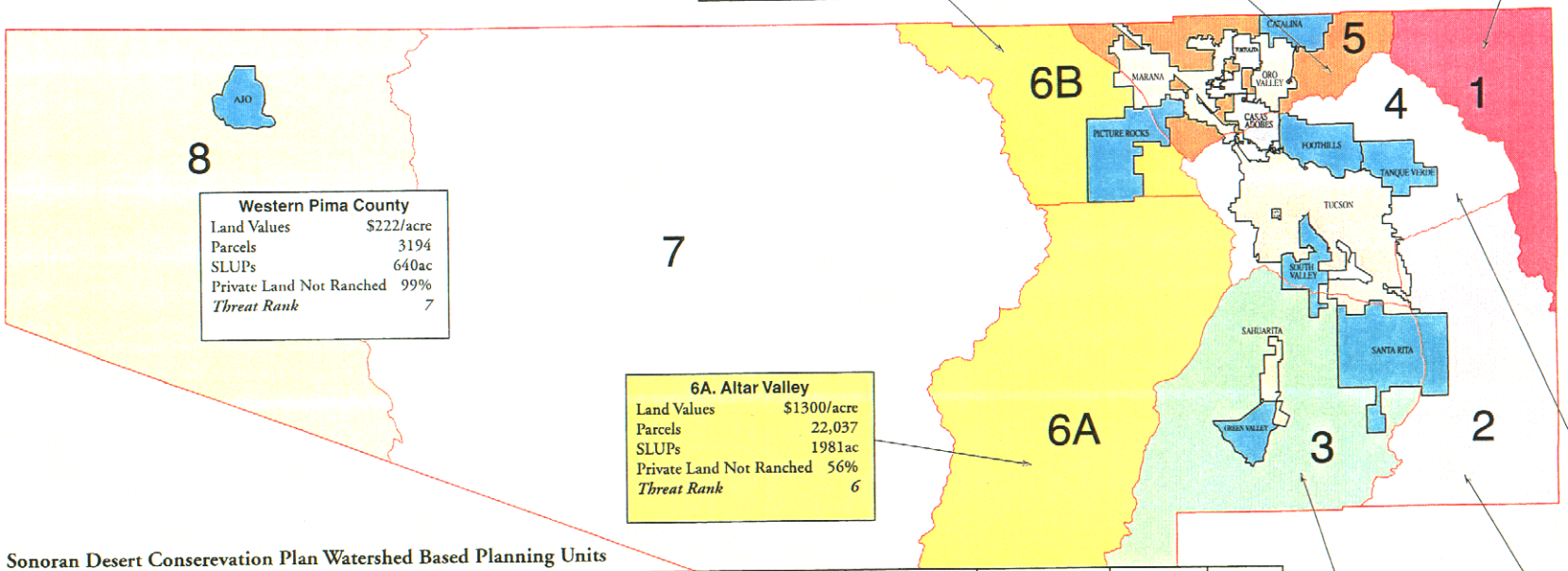
HIGHEST THREATS TO RANCH LANDS AT THE WATERSHED LEVEL

Most Threatened Ranchlands			
Sub Area	Land Values/Acre	ASLD SLUPs	% Private Land
Middle Santa Cruz	$68,000	18,000 acres	56
Tortolita Fan	$25,000	11,000 acres	52
Upper Santa Cruz	$4,000	49,000 acres	35

6B. Avra Valley
Land Values $2000/acre
Parcels 7900
SLUPs 645ac
Private Land Not Ranched 76%
Threat Rank 4

5. Tortolita Fan
Land Values $25,000/acre
Parcels 48,863
SLUPs 11,101ac
Private Land Not Ranched 82%
Threat Rank 2

1. Middle San Pedro
Land Values $782/acre
Parcels 598
SLUPs 0ac
Private Land Not Ranched 28%
Threat Rank 8



Western Pima County
Land Values $222/acre
Parcels 3194
SLUPs 640ac
Private Land Not Ranched 99%
Threat Rank 7

6A. Altar Valley
Land Values $1300/acre
Parcels 22,037
SLUPs 1981ac
Private Land Not Ranched 56%
Threat Rank 6

Pima County Highest Threats to Ranch Lands Watershed Comparison

SDCP Planning Units (Watersheds)
Incorporated Areas
Unincorporated Urbanizing Areas
Pending Incorporated Areas

Incorporated Areas
1. Marana
2. Oro Valley
3. Sahuarita
4. South Tucson
5. Tucson
Unincorporated Urbanizing Areas
1. Ajo
2. Arivaca
3. Catalina
4. Foothills
5. Green Valley
6. Picture Rocks
7. Santa Rita
8. South Valley
9. Tanque Verde
Pending Incorporated Areas
1. Casas Adobes
2. Tortolita

N

4. Middle Santa Cruz
Land Values $68,000/acre
Parcels 217,093
SLUPs 17,919ac
Private Land Not Ranched 98%
Threat Rank 1

2. Cienega – Rincon
Land Values $1500/acre
Parcels 5704
SLUPs 7817ac
Private Land Not Ranched 52%
Threat Rank 5

3. Upper Santa Cruz
Land Values $4000/acre
Parcels 28,127
SLUPs 49,075ac
Private Land Not Ranched 64%
Threat Rank 3

Sonoran Desert Conserevation Plan Watershed Based Planning Units

Area	Total # of Acres	% Private	% State	% Federal	% Private Land Not Ranched	Land Values per Acre	% RH Zoning	ASLD (acres) SLUPs	*Proximity to Urban Boundary	Subdivided Parcels	Overall Rank
Middle San Pedro	174,314	14.5	38.7	47	28	$782	100	0	3.0	598	8
Cienega - Rincon	318,535	22.6	39.3	38	52	1,500	88	7,817	2.5	5,704	5
Upper Santa Cruz	449,685	34.8	47.3	18	64	4,000	92	49,075	2.0	28,127	3
Middle Santa Cruz	361,852	55.6	5.5	38	98	68,000	0	17,919	1.0	217,093	1
Tortolita Fan	203,546	52.3	22.7	25	82	25,000	83	11,101	1.5	48,863	2
Altar Valley	713,807	20.0	45	35	56	1,300	94	1,981	2.5	22,037	6
Avra Valley	221,404	31.5	22	46	76	2,000	84	645	2.0	7,900	4
Tohono Nation	2,354,911	0.7	1.3	-	-	-	-	-	-	-	-
Western Pima County	1,082,282	1.2	.25	99	99	222	65	640	4.0	3,194	7
Pima County Totals	5,880,337										
Eastern Pima County Totals	2,443,144										
16 Urbanizing Areas	468,089										

**Urban Boundary Proximity: 1=urban area; 2=accessible; 3=not easily accessible; 4=distant from urban area.*

V- 4. Conservation Potential of the Ranching Land Base

To conclude this assessment of the characteristics of Pima County ranch lands and to provide the best available information regarding the potential for ranch land conservation, it was critical to assess not only the extent, capacity and threats, but also those variables that contribute to sustainable ranching. In this assessment, some of the same variables used in earlier evaluations will be used to characterize conservation potential and sustainability, such as livestock carrying capacity, as well as others that address the integrity and connectivity of the landscape and the stability of ranching use. These variables include:

- % State and BLM ownership
- % private lands used in ranching
- Acres of State and Federal land grazing leases
- Number of ranches
- Livestock carrying capacity by number
- Acres of Federal lands grazed
- Acres of roadlessness

Highest Percentage of State and Federal Land Ownership

Unlike private lands, which can be more readily sold and developed, State and Federal lands tend to stay in trust status or public ownership and to continue in grazing use under the management of the public entity that owns the land. Even when virtually all private lands have been sold and subdivided for development as has happened in the Middle Santa Cruz Valley, it is the State and public lands that tend to remain in ranching use and that are the last lands to be sold for development. This is illustrated by the remaining State Trust grazing lands in the southeastern portion of that subarea, and Forest Service lands that are unlikely to ever be sold. This tendency is also illustrated in the Tortolita Fan area where very little private land remains in ranching use while State Trust lands and Forest lands provide the majority of grazing lands.

With this variable, the subarea with the highest State and Federal ownership is Western Pima County at 99 percent, followed by the San Pedro at 85 percent, the Altar Valley at 80 percent, the Empire-Cienega Valley at 79 percent, and the Avra Valley at 69 percent. The subareas with the lowest public land ownership represent the urbanizing areas of the Upper Santa Cruz Valley, the Tortolita Fan, and the Middle Santa Cruz Valley.

Highest Percentage of Private Lands in Ranching Use

As noted elsewhere, a higher percentage of private lands committed to ranching use represent both stability and sustainability of ranching as well as lower threats from increasing land values, proximity to the urban core, and sale, subdivision, and development.

This assessment reveals that the San Pedro Valley has the highest percentage of private lands used in ranching at 74 percent, followed by the Altar Valley at 44 percent, the Empire-Cienega Valley at 42 percent, and the Upper Santa Cruz Valley at 36 percent, and the Avra

Valley at 24 percent. The most highly urbanized valleys and those with the highest land values show a marked drop in private lands used in ranching, with the Tortolita Fan at about 5 percent and the Middle Santa Cruz at only 2 percent. Western Pima County with its paucity of private land has less than 1 percent of its private land dedicated to ranching use.

Stability of Grazing Leases

Similar to the concept that a higher percentage of state and public lands will result in greater stability of land use, the number of acres actually dedicated to grazing leases is perhaps a more direct measure of the stability of the regional land base committed to ranch use. In this analysis, the aggregate total of State Trust, BLM, and Forest leases was calculated for each watershed as an absolute ranking of the amount of public lands likely to remain in livestock grazing.

This evaluation reveals that the Altar Valley has the highest number of acres of grazing leases at nearly 366,000 acres, followed by the Upper Santa Cruz Valley at 251,000 acres, and the Empire-Cienega Valley at 212,000 acres. Western Pima County was fourth with 175,000 acres followed by the San Pedro Valley, the Avra Valley, the Tortolita Fan, and the Middle Santa Cruz Valley.

Federal Lands in Grazing Leases

To take this variable one step further in assessing stability, the number of Federal acres dedicated to ranching use was examined because of the greater overall stability of Federal lands. Because State Trust lands are managed for disposal rather than long-term conservation, there is inherently less stability in State grazing leases and permits than there is with Federal leases, for which there is no disposal mandate. This assessment also takes into account what BLM has defined as areas for long-term management, which also allow grazing to continue. These areas in eastern Pima County include the Ironwood National Monument area, the Tortolita Mountains, the Coyote-Baboquivari Mountains, and the proposed Las Cienegas NCA.

This analysis reveals slightly different results. In this analysis, Western Pima County ranks highest with 175,000 acres, followed by the Empire-Cienega Valley, the Avra Valley, the San Pedro Valley, the Altar Valley, the Upper Santa Cruz Valley, the Middle Santa Cruz Valley, and the Tortolita Fan with the lowest acreage of Federal lands in grazing leases.

Number of Ranches

The number of ranches is also indicative of stability and sustainabilty and it is used again in this final analysis of ranch conservation potential. The Altar Valley ranks highest with more than 31 ranches operating in the watershed, followed by the Empire-Cienega with 28, the Upper Santa Cruz with 25, the Avra Valley with 13, the San Pedro with 11, the Tortolita Fan with 9, and only 5 ranches or leases in Western Pima County and the Middle Santa Cruz.

Livestock Capacity

As with the number of ranches, this variable is used here again as an indicator of stability, sustainability and productivity and as a measure of long-term conservation potential. Carrying capacity by number is used to determine what proportion of the entire Pima County livestock count is supported by each subarea. Regionally, Pima County has approximately 20,000 head of livestock not counting tribal lands. These are distributed throughout the eastern and western county based on overall range health and carrying capacity permitted by grazing leases.

In this analysis, the Altar Valley ranks highest with 6640 animals or 33 percent of the entire herd, followed by the Upper Santa Cruz with 4315 animals or 22 percent of the herd, the Empire-Cienega Valley with 4250 animals or 21 percent of the herd, and the San Pedro Valley with 1917 animals or 10 percent of the herd. Together these four valleys support some 86 percent of the entire livestock capacity of Pima County, while the lower elevation and urbanizing valleys support only some 14 percent.

Connectivity and Roadlessness

To achieve some measure of the integrity of natural open space used for ranching purposes, the amount of roadless areas was used to perhaps best define where unfragmented expanses of the natural landscape occur that appear to be the least threatened by human use. In this assessment, GIS technology using available data for mapped roads and aerial photography were used to define contiguous acreages where no roads are identified.

The subareas with the greatest integrity defined by roadless areas are Western Pima County with 400,000 acres, followed by the Altar Valley with 276,000 acres, the Empire-Cienega Valley with 95,000 acres, the Upper Santa Cruz Valley with 89,000 acres, the Middle Santa Cruz Valley with 61,000 acres, the San Pedro Valley with 55,000 acres, the Tortolita Fan with 49,000 acres, and the Avra Valley with 28,000 acres.

Comparative Assessment of Ranch Conservation Potential

In assessing the potential for the conservation of Pima County ranch lands in each of the County subareas, seven variables were considered that reflect this characteristic, and a composite score and overall rank were calculated to compare the subareas.

The composite score for the potential for ranch conservation reveals again that it is the rural upland valleys that have the highest potential for ranch conservation, which exhibit the greatest amount of public lands, highest acreages of federal grazing leases, highest livestock capacity, the highest number of ranches, and the greatest integrity of natural open space.

These are also the subareas that exhibit the fewest overall threats from ranch land conversion, with the exception of fragmenting areas of private land and State and BLM lands for commercial sale or use within the 25 radius of the urban core that appear to be most vulnerable to sale and subdivision. Table V-4.1 shows the results of this analysis.

Table V-4.1 Ranked Comparison of Ranch Land Conservation Potential by Pima County Subarea

Pima County Valley or Subarea (Area in Acres/Size)	Ownership % Public & Rank	Ranch Use % Private & Rank	Stability: Ac. Leases & Rank	Ranches: Number & Rank	Capacity: Max. AUs & Rank	Preserves Grazed & Rank	Roadless: Areas/Ac & Rank	Conserv. Potential & Rank
1. San Pedro Valley 174,315 ac (272 Sq.Mi.)	85% 2	74% 1	158,674 5	11 5	1917 4	73,032 4	54,899 6	3
2. Empire-Cienega Valley 318,535 ac (498 Sq.Mi.)	79% 4	42% 3	212,360 3	28 2	4250 3	88,176 2	94,798 3	2
3. Upper Santa Cruz 449,684 ac (703 Sq.Mi.)	65% 6	36% 4	251,183 2	25 3	4315 2	47,878 6	88,595 4	3
4. Middle Santa Cruz 361,851 ac (565 Sq.Mi.)	46% 8	2% 7	51,918 8	5 7	666 7	34,000 7	61,026 5	7
5. Tortolita Fan 203,546 ac (318 Sq.Mi.)	50% 7	5% 6	66,189 7	9 6	679 6	23,883 8	48,709 7	6
6a. Altar Valley 713,807ac (1115Sq.Mi.)	80% 3	44% 2	365,779 1	31 1	6640 1	51,320 5	276,233 2	1
6b. Avra Valley 221,404 ac (346 Sq.Mi.)	69% 5	24% 5	133,062 6	13 4	834 5	85,388 3	27,791 8	5
8. Western Pima Co. 1,082,281ac 1691SqMi	99% 1	<1% 8	174,918 4	5 7	604 8	174,846 1	400,434 1	4

Ranked with a composite score, the lands with the highest potential for ranch land conservation include the Altar Valley, followed by the Empire-Cienega Valley, the San Pedro Valley, the Upper Santa Cruz Valley, Western Pima County, Avra Valley, the Tortolita Fan, and last the Middle Santa Cruz Valley.

The Altar Valley, ranked first in overall potential for ranch conservation, is shown to rank highest in three categories – highest stability of grazing lease acres, highest number of ranches, and highest livestock capacity, and second highest in percentage of private lands in ranch use and in integrity of natural open space. The Altar ranked third in State and public land ownership. Its vulnerability is the high amount of State Trust grazing lease lands that could be sold or leased in the future for commercial purposes and the low amount of Federal lands leased for grazing.

The Empire-Cienega Valley, ranked second overall in conservation potential, and also ranks second in percentage of number of ranches and federal lands used for ranching purposes, and third highest in four categories – percentage area of private lands used in ranching, stability of grazing lease acres, livestock capacity, and integrity of open space.

The Upper Santa Cruz Valley, ranked third overall in conservation potential, and ranks second overall in stability of acreage of public lands leased for grazing and livestock capacity, and ranks third in number of ranches, and fourth in percentage of private lands used in ranching and integrity of open space.

The San Pedro Valley, also ranked third overall in conservation potential, and ranked first in percentage of private land in ranching use, second in highest State and public land ownership, and fourth in livestock capacity and federal lands used in grazing.

The remaining four subareas exhibited lower overall potential for ranch conservation due to lower natural suitability for ranching in the lower elevation subareas and because of urbanization and the conversion of the ranching land base to other uses.

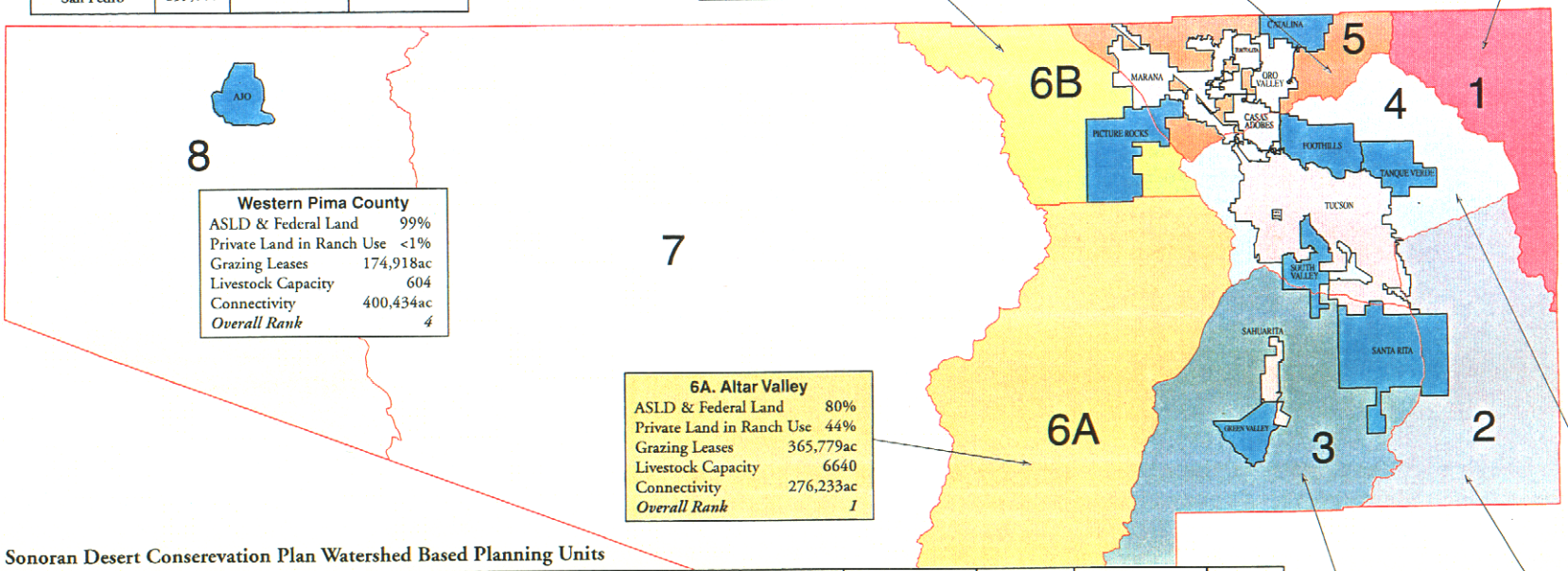
POTENTIAL FOR RANCHLAND CONSERVATION AT THE WATERSHED LEVEL

Highest Potential for Ranchland Conservation			
Sub Area	Grazing Lease Acres	Roadless Acres	Capacity Retained
Altar Valley	366,000	276,000	6640
Empire-Cienega-Rincon	212,000	95,000	4250
Upper Santa Cruz	251,000	89,000	4315
San Pedro	159,000	55,000	1917

6B. Avra Valley
ASLD & Federal Land 69%
Private Land in Ranch Use 24%
Grazing Leases 133,062ac
Livestock Capacity 834
Connectivity 27,791ac
Overall Rank 5

5. Tortolita Fan
ASLD & Federal Land 50%
Private Land in Ranch Use 5%
Grazing Leases 66,189ac
Livestock Capacity 679
Connectivity 48,709ac
Overall Rank 6

1. Middle San Pedro
ASLD & Federal Land 85%
Private Land in Ranch Use 74%
Grazing Leases 158,674ac
Livestock Capacity 1917
Connectivity 54,899ac
Overall Rank 3



Western Pima County
ASLD & Federal Land 99%
Private Land in Ranch Use <1%
Grazing Leases 174,918ac
Livestock Capacity 604
Connectivity 400,434ac
Overall Rank 4

6A. Altar Valley
ASLD & Federal Land 80%
Private Land in Ranch Use 44%
Grazing Leases 365,779ac
Livestock Capacity 6640
Connectivity 276,233ac
Overall Rank 1

Pima County Potential for Ranchland Conservation Watershed Comparison

SDCP Planning Units (Watersheds)
Incorporated Areas
Unincorporated Urbanizing Areas
Pending Incorporated Areas

Incorporated Areas
1. Marana
2. Oro Valley
3. Sahuarita
4. South Tucson
5. Tucson
Unincorporated Urbanizing Areas
1. Ajo
2. Arivaca
3. Catalina
4. Foothills
5. Green Valley
6. Picture Rocks
7. Santa Rita
8. South Valley
9. Tanque Verde
Pending Incorporated Areas
1. Casas Adobes
2. Tortolita

N

4. Middle Santa Cruz
ASLD & Federal Land 46%
Private Land in Ranch Use 2%
Grazing Leases 51,918ac
Livestock Capacity 666
Connectivity 61,026ac
Overall Rank 7

2. Cienega – Rincon
ASLD & Federal Land 79%
Private Land in Ranch Use 42%
Grazing Leases 212,360ac
Livestock Capacity 4250
Connectivity 94,798ac
Overall Rank 2

3. Upper Santa Cruz
ASLD & Federal Land 65%
Private Land in Ranch Use 36%
Grazing Leases 251,183ac
Livestock Capacity 4315
Connectivity 88,595ac
Overall Rank 3

Sonoran Desert Conserevation Plan Watershed Based Planning Units

Area	Total # of Acres	% Private	% State	% Federal	% ASLD & Federal Lands	% Private Land in Ranch Use	Number of Ranches	Acres of Grazing Leases	Livestock Capacity	Connectivity Roadless Acres	Overall Rank
Middle San Pedro	174,314	14.5	38.7	47	85	74	11	158,674	1917	54,899	3
Cienega - Rincon	318,535	22.6	39.3	38	79	42	28	212,360	4250	94,798	2
Upper Santa Cruz	449,685	34.8	47.3	18	65	36	25	251,183	4315	88,595	3
Middle Santa Cruz	361,852	55.6	5.5	38	46	2	5	51,918	666	61,026	7
Tortolita Fan	203,546	52.3	22.7	25	50	5	9	66,189	679	48,709	6
Altar Valley	713,807	20.0	45	35	80	44	31	365,779	6640	276,233	1
Avra Valley	221,404	31.5	22	46	69	24	13	133,062	834	27,791	5
Tohono Nation	2,354,911	0.7	1.3	-	-	-	-	-	-	-	-
Western Pima County	1,082,282	1.2	.25	99	99	<1	5	174,918	604	400,434	4
Pima County Totals	5,880,337								19,905		
Eastern Pima County Totals	2,443,144								19,301		
16 Urbanizing Areas	468,089										

VI. Summary of Findings

Central to the debate over ranching versus real estate development in Pima County is the sheer magnitude of the land area that could be converted from ranch lands and open space to development. While Federal agencies own some 36 percent of the county's land base, excluding tribal lands, that are not likely to be sold for development, State Trust and private lands together comprise some 64 percent of eastern Pima County, and much of this land could become vulnerable to future development. If current growth continues and low-density development trends persist, the Tucson metropolitan area could expand significantly, resulting in the loss of open space that is critical to our community's quality of life, the integrity of our natural environment, and the conservation of our natural and cultural values.

Growth and sprawl are not unique to Pima County, which was recognized in 1998, by Governor Jane Hull and the State of Arizona legislature in the appointment of the Growing Smarter Commission, which was charged with developing recommendations for "a new framework for managing Arizona's growth and new growth management tools ... to meet the challenges of maintaining Arizona's quality of life in the 21st Century." After five months of study, the Commission developed a draft report and recommendations focused on five goals:

- Guiding Arizona's growth decisions through incentives, improved regional coordination, and enhanced citizen participation.
- Providing local tools to manage growth, such as infill incentives, service area boundaries, lot-split regulation, cost of growth recovery, and comprehensive plans.
- Creating meaningful open spaces, through establishing a state land stewardship trust, authorization of land exchanges, expand the Arizona Preserve Initiative program, and establish a state-wide voluntary purchase of development rights on private or State Trust lands with existing productive agricultural or ranch use.
- Encouraging rural economic development, through infrastructure assistance, economic planning, and assistance with the Endangered Species Act compliance.
- Modernizing the State Trust Land Mission, through amending the Trust mandate to include both fiduciary and conservation directives, expanding funding purposes, enhancing sale procedures, providing incentives for grazing/agricultural stewardship.

In 1999, the Growing Smarter legislation was expanded as Growing Smarter Plus to reflect these and other recommendations and to provide for the Arizona Conservation Reserve for the purpose of protecting up to three percent of certain State Trust lands. The eligibility of this measure for the November 2000 ballot remains uncertain; however, if it is approved, its passage would not ensure that sufficient State Trust lands would be conserved, especially in eastern Pima County with large and disproportionate amounts of State Trust lands. Despite the conservation designation for some State Trust lands and the establishment of a "development rights retirement fund" grants program, there would remain a significant threat for the conversion of large areas of State Trust ranch land to development.

Sprawling development has numerous costs – loss of open space, loss of natural habitat, dirty air, traffic congestion, greatly increased infrastructure costs, and urban disinvestment. But growth in itself is not the problem; instead it is really the solution. The problem is where and how growth occurs, and the solution is putting the best quality development in the right places, while conserving the integrity of our remaining open space, much of it ranch lands.

As noted by the Arizona Common Ground Roundtable core working group in its 1998 discussion paper on the loss of open space, "historically, ranching has proved uniquely capable of protecting grassland and riparian areas from landscape fragmentation. Due to Arizona's aridity, large land areas are required to support ecologically sustainable ranching operations ... and to be large enough, most ranches must combine the private land of the rancher with grazing land leased from federal and state governments. Thus lands are often managed as single units, across ownership boundaries, which keeps large areas free from development while still accessible to a variety of other uses in addition to ranching."

Given the realities of continued growth and the need to preserve ranch lands for a variety of conservation purposes consistent with the Sonoran Desert Conservation Plan, the foregoing analysis of ranching as a land use in the various subareas was conducted in an attempt to assess which subareas have the greatest extent, productivity, and conservation potential for ranch lands, and which are experiencing the greatest threats from development pressure.

Table VI.1 Pima County Subareas Ranked for Ranch Conservation Potential

❑ Highest Extent of Ranch lands

1. Altar Valley
2. Empire-Cienega Valley
3. Upper Santa Cruz Valley
4. San Pedro Valley
5. Avra Valley
6. Tortolita Fan
7. Western Pima County
8. Middle Santa Cruz Valley

❑ Highest Productivity or Grazing Capacity

1. Empire-Cienega Valley
2. Altar Valley
3. Upper Santa Cruz Valley
4. San Pedro Valley
5. Middle Santa Cruz Valley
6. Tortolita Fan
7. Avra Valley
8. Western Pima County

❑ Highest Threats to Ranch lands

1. Middle Santa Cruz Valley
2. Tortolita Fan
3. Upper Santa Cruz Valley
4. Avra Valley*
5. Empire-Cienega Valley
6. Altar Valley
7. Western Pima County
8. San Pedro Valley

❑ Highest Ranch Conservation Potential

1. Altar Valley
2. Empire-Cienega
3. Upper Santa Cruz Valley
3. San Pedro Valley
4. Western Pima County
5. Avra Valley*
6. Tortolita Fan
7. Middle Santa Cruz

*The Ironwood National Monument continues ranching and grazing under BLM management within the Monument boundaries.

The results of these various analyses consistently identify the Altar Valley, Empire-Cienega Valley, Upper Santa Cruz Valley, and San Pedro Valley as the subareas where ranching comprises a significant land use, and where their capacity and stability suggest the best potential for sustainable ranch use. It is therefore concluded that ranch lands in these valleys and in the Avra Valley Ironwood National Monument area have the best potential to define the urban boundary, where developed lands at the urban edge give way to natural open space. The rankings of these valleys by extent, productivity and capacity, threats, and overall conservation potential are presented below. Ranching in the Middle Santa Cruz Valley is the most threatened, least sustainable, and least likely to continue, while ranching on the Tortolita Fan is only marginally better.

The Altar Valley

Of the eastern Pima County subareas, the Altar Valley is the largest and ranks the very highest in extent of ranch lands and overall conservation potential, second in livestock capacity and productivity, and is experiencing relatively low threats from development pressure.

In part because of its large size, the acreage committed to ranching use in the Altar Valley is the highest at 429,000 acres, or some 27 percent of all the ranch lands throughout Pima County, excluding tribal lands, and this is certainly the largest proportion of dedicated ranching use. The Altar Valley also has the highest number of ranches, the highest number of water source improvements, and the greatest livestock capacity by number at 6640 animals or 33 percent of the entire Pima County "herd." Approximately 70 percent of the valley is currently used for ranching; it has the highest amount of grazing lease lands at nearly 366,000 acres; and the highest amount of private lands classified for ranching use at nearly 64,000 acres. Many of these private ranch lands represent original homestead claims that are also some of the most environmentally sensitive lands, located at springs and along the Altar Wash itself. These private lands form the core of the ranching operation that leases adjoining State or BLM lands for grazing purposes. What results is a nearly seamless and connected expanse of ranch lands and natural open space that runs north to south and east to west across the valley. Except for the vastness of Western Pima County, the Altar Valley also has the highest area of roadlessness, at 276,000 acres, that is a measure of the integrity of its natural open space.

The Altar Valley Conservation Alliance (AVCA) also contributes significantly to the potential for ranch conservation in this subarea. This citizens group comprised of ranchers and other residents of this rural valley organized in 1995 to promote land stewardship projects, to collaborate with resource management agencies, and to work together to advance environmental, cultural, and historical goals. Their mission statement, in part, reads:

> *Ranch families created the Altar Valley Conservation Alliance to care the Altar Valley watershed where we live and work. Our mission is to leave the next generation with a healthy productive watershed, a thriving ranching community and rural lifestyle enriched by the culture and history of the Altar Valley, and continued multiple-use opportunities for all people, including those who live outside the Altar Valley. Our work together is inspired by a shared commitment to keeping the Altar Valley a beautiful and productive place for people and the natural world.*

To date, the AVCA has obtained a grant from the Arizona Water Protection Fund to conduct a resource assessment that will result in a stewardship action plan for the watershed. Recent reports include studies of the valley's natural resources, soils and vegetation, documentation of historic conditions, an environmental assessment for an erosion control structure, and they have prepared a fire management plan in cooperation with the State Land Department. Given the important achievements and vision of this group to improve the hydrological and range health of the watershed, the potential for ranch conservation and habitat improvement is greatly enhanced.

Development pressure in the Altar Valley is generally low due to the stability of ranching use, a largely unfragmented landscape, low density zoning, and the distance from any major

transportation corridors. However, within the 25 mile radius from the urban core, the Altar Valley is experiencing fragmentation and development in the northeastern portion of the valley near the Tucson Mountains, along Ajo Road at Robles Junction, and at Diamond Bell Ranch near the Sierrita Mountains. Outside the 25 mile radius, there is a very significant integrity of ranch lands that has an excellent potential for conservation.

What will remain problematic for the future of ranching in the Altar Valley is the dependence on State Trust lands for grazing leases, which can be terminated by the State Land Department for conversion to commercial use at any time, even during the active lease period. Of the total 429,000 acres of ranch lands, some 73 percent or 314,500 acres, are State Trust lands. This reflects the disproportionately high amount of State land in eastern Pima County, as well as the potential future threat to ranching from the commercial sale or lease and conversion of these lands for development.

The Empire-Cienega Valley

The Empire Cienega Valley may also be considered to have an excellent potential for ranch conservation, ranking first in livestock capacity and productivity and only slightly behind the Altar Valley in overall extent and conservation potential. At the present time, there is a relatively low threat from development pressure with most development limited to the area within the 25 mile radius of the Tucson urban core and in the Empire Mountain area.

As with the Altar Valley, a significant portion of the valley is committed to ranching use at 77 percent, totaling some 244,000 acres, and including some 42 percent of all private lands. The Empire-Cienega Valley ranks highest in grassland vegetation at 70 percent, and highest in livestock capacity by average number of animals per square mile at 11 per section. Its capacity by number of livestock at 4250 animals represents some 21 percent of livestock in eastern and western Pima County, and it is second overall in number of ranches, water source improvements, federal land grazing leases, and in total area of the valley dedicated to ranching. Some 42 percent of its private holdings are classified for ranch lands.

Like the Altar Valley, ranching interests, the BLM, private property owners, recreation groups, and other local stakeholders joined together in 1995 to form the Sonoita Valley Planning Partnership (SVPP) to formulate a vision for the future of the Sonoita Valley. The area of interest includes the Cienega Creek watershed south of I-10 to Sonoita Creek and the Babocomari River in Santa Cruz County, and generally coincides with the proposed boundaries for the Las Cienegas National Conservation Area discussed below. Their vision statement reads:

> *The Sonoita Valley Planning Partnership will work together to perpetuate naturally functioning ecosystems while preserving the rural, grassland character of the Sonoita Valley for future generations.*

However, unlike the Altar Valley Conservation Alliance, which seeks to address land improvements on both private and public lands, the Sonoita Valley Planning Partnership is principally concerned with use and management issues affecting public and State Trust lands.

Some of these issues include mineral use and impacts, utilities, off-highway vehicle use and impacts, trail development, management of outdoor recreation, management of livestock grazing, management of water quality and riparian area vegetation, endangered species and habitat management, and cultural resources management.

With the adoption of desired goals for these issues, the SVPP has developed alternative management strategies with the BLM that are being incorporated into the Empire-Cienega Integrated Management Plan and Environmental Impact Statement for the Empire-Cienega Resource Conservation Area, and is currently working on development of a comprehensive monitoring program for the RCA.

Of significant importance to the future of ranching in this subarea, the lands within the Empire-Cienega RCA have recently been included in a larger proposal for congressional designation of the Las Cienegas National Conservation Area. This legislation introduced by Arizona Congressman Jim Kolbe in1999 bases the required management plan for the NCA on the plan being developed through the SVPP process. Should designation occur, the SVPP is likely to continue to be involved in planning for the NCA.

At the present time, development pressure is relatively low overall in the Empire-Cienega valley, but increases substantially within the 25 radius of the Tucson urban core. Growth and urbanization are greatest in the northwest portion of the subarea near the Tucson city limits where the planned Rocking K Ranch and Vail Valley Ranch developments will eventually cover more than 6200 acres.

In addition to these planned developments and existing subdivisions, the Arizona State Land Department has identified four Special Land Use Permit areas along the I-10 corridor and one at the eastern edge that total some 7857 acres. These SLUPs are currently grazing lands in transition that have been reclassified by the ASLD for commercial sale or lease. Should the NCA designation be successful, two of the these SLUPs, one along Cienega Creek and one north of the Whetstone Mountains would be incorporated into the NCA boundary and consequently would probably not be developed.

Overall, the potential for ranch conservation in the Empire-Cienega Valley remains quite high, but like the Altar Valley there could be significant losses of ranch lands if State Trust lands are sold or leased for commercial purposes in the future. In the best of circumstances, the establishment of Las Cienegas NCA would serve to ensure the stability and sustainability of ranch lands for much of the Empire-Cienega Valley.

Upper Santa Cruz Valley

Following only slightly behind the Altar and Empire-Cienega valleys in overall rankings, the Upper Santa Cruz Valley has a high extent of ranch lands and carrying capacity and ranks third together with the San Pedro in the potential for ranch conservation. In fact, the Upper Santa Cruz Valley ranks second overall in size and has a greater amount of area, some 308,000 acres, dedicated to ranching use than the Empire-Cienega or San Pedro valleys and a greater capacity by number at 4315 head of livestock. It also ranks second overall in croplands.

The Upper Santa Cruz Valley ranks third in number of ranches at 25, percent ranching use of the entire valley at 74 percent, area of grasslands at 63 percent, number of improved water sources at 551, and has significant areas of roadlessness at 88,500 acres, which also reflects a significant degree of integrity of the natural landscape.

Unique to the Upper Santa Cruz Valley is the depth of history of ranching dating to Spanish and Mexican land grants at the Canoa and Sopori ranches in the 18th and early 19th centuries, as well as the very extensive Santa Rita Experimental Range established in 1903, which is today the oldest research area founded by the US Forest Service and has remained a principal site for range research on the improvement and management of semi-arid grasslands in the Southwest. To the west of the Santa Cruz River, he Upper Santa Cruz Valley today is also home to unfragmented ranch lands that include the extensive Marley and Sopori ranches, the adjoining Rancho Seco and Santa Lucia Ranch, and farther north to the McGee Ranch settlement founded in 1895, that is today a community of about 350 people.

While the potential for ranch conservation is generally very good in the eastern and western upland areas of the Upper Santa Cruz Valley, ranch and crop lands in the central and northern portions of the valley are significantly more threatened by urbanization within the 25 mile radius of the Tucson urban core that includes the ASARCO mines, the town of Sahuarita and the Green Valley area as well as strip development along the I-19 corridor. This has effectively split the ranch use of the valley into two halves, with sustainable ranching more likely to continue in the eastern and western uplands that adjoin the Empire-Cienega and Altar valleys and continued development more likely along I-19 and the Santa Cruz River.

In addition to these ongoing development trends, the ASLD has reclassified large tracts of current grazing land in the developing northern portions of the watershed for commercial sale or lease. When combined with interspersed private lands, this total is nearly 49,000 acres that could become available for development. Specifically, there are eight SLUPs clustered within the 25 mile radius of Tucson that extend from the current limits of the City of Tucson south to the northern boundary of the Santa Rita Experimental Range and to the west of Sahuarita and the ASARCO mines.

While currently classified as "trust lands in university grant status," even the Santa Rita Experimental Range, which was transferred from the US Forest Service to the ASLD in 1988, could be converted to other uses in the future if "... the legislature determines that the research use can be terminated on all or part of the lands." Currently used by the University of Arizona for grasslands research in cooperation with a local ranching family, the 53,000 acre Santa Rita Experimental Range comprises a very significant portion of the unfragmented ranch lands in the Upper Santa Cruz Valley.

As with the Altar Valley, what will remain problematic for the future of ranching in the Upper Santa Cruz Valley is the dependence on Arizona State Trust lands. Here, State Trust lands of 203,000 acres comprise some 66 percent of all ranch lands in the valley. Moreover, of all four subareas with the highest potential for sustainable ranch use, the Upper Santa Cruz is the most threatened by the conversion of private and State Trust lands from ranching to commercial use.

The San Pedro Valley

The San Pedro Valley, the smallest of the subareas, nonetheless ranks among the highest for ranch land conservation. It ranks first of all the subareas in the percentage of the land base dedicated to ranching use at 91 percent and first in the percentage of private lands dedicated to ranch use at 74 percent, and second overall in federal and state land ownership at 85 percent. It ranks fourth overall in livestock capacity at 1917 animals and in number of animals per square mile, grassland vegetation at 46 percent, number of improved water sources, and in the amount of federal grazing leases. Unlike the top three subareas, which are each experiencing some development pressure, the San Pedro Valley ranked the very lowest in potential threats. It has the highest amount of RH zoning, no SLUPs or BLM lands designated for disposal or commercial use, the lowest amount of private lands not used in ranching, the lowest population, and the lowest number of subdivided parcels. When adjacent Forest Service lands are considered, the San Pedro has significant areas of roadlessness where the integrity of the natural landscape is maintained. At the present time, access into the valley is difficult, and most of the private holdings lie beyond the 25 mile radius from the Tucson core.

With the acquisition of the Bellota/A7 Ranch by the City of Tucson in 1999, some 6828 acres of deeded land, 34,186 acres of State Trust land, and 80 acres of BLM land totaling 41,094 acres were reasonably secured from future urban expansion into the San Pedro Valley. This area just east of Redington Pass and extending to the San Pedro River is likely to have been the route of suburban development had Redington Road been improved. The City of Tucson is working to improve the natural ranch lands and maintain the ranch as a working ranch and possible grass bank.

As a consequence of the stability of its ranch lands and very little development pressure, the San Pedro has a very high potential of continued and sustainable ranch use.

Avra Valley

Like the Upper Santa Cruz Valley, ranching in portions of the Avra Valley with low amounts of public lands are highly threatened by fragmentation and development, while areas with a high proportion of public land in the western half are less susceptible to development.

Despite the fairly low livestock capacity of the Avra Valley because of its lower elevation, still some 68 percent of the subarea supports ranch use and some 834 head of livestock. While its lower overall ranching capacity and rapid urbanization in the eastern portions resulted in its being ranked 5th for ranch conservation potential out of the eight subareas, this land use is now more certain than in other parts of the region.

With the recent establishment of the Ironwood National Monument, ranching in the Avra Valley is now perhaps more secure than ranching in portions of the larger upland valleys with higher livestock productivity and capacity. The National Monument proclamation issued on June 9, 2000 states that the BLM will manage the monument area, and that "... grazing permits or leases on all lands under its jurisdiction shall continue to apply with regard to t he lands in the monument."

Consequently, the 129,000 acres included in the Ironwood Monument in Pima County that are currently used in ranching will continue to be used for that purpose. This represents some 86 percent of all the Avra Valley ranch lands that have a virtual guarantee of continued ranching use. It should also be noted that BLM lands that were once identified for disposal are now to be preserved and used for ranching within the Ironwood National Monument. Because of the unique designation of the Ironwood National Monument and the acknowledgment that grazing will continue as an acceptable land use, the actual potential of the Avra Valley for ranch conservation is now higher than might otherwise be estimated.

Western Pima County

Western Pima County, the lowest in elevation, rainfall, and livestock capacity of the Pima County subareas, still ranks reasonably high for ranch land conservation because of its high amount of federal lands used in ranching at 175,000 acres, lack of State Trust lands that may be converted to other uses, and its overall lack of threat from development pressure.

Livestock grazing capacity drops to only 604 animals here, or only 2 head of livestock per square mile, and represents only 3 percent of the entire eastern and western Pima County herd. Moreover, grazing is restricted to only 18 percent of the entire area and precluded from the adjoining federal land preserves such as Organ Pipe National Monument and Cabeza Prieta National Wildlife Refuge that comprise the majority of the lands. Because the region's suitability for livestock grazing and ranching is marginal and development pressure is very low, its potential for sustainable ranch use in the future is likely to be limited by natural, environmental factors and not by future development trends.

The Tortolita Fan

The Tortolita Fan, once characterized by predominantly ranching and agricultural use, is now experiencing significant development pressure and the rapid conversion of agricultural lands to commercial and residential development. Located almost entirely within the 25 mile radius of the Tucson urban core, this subarea has a low acreage of ranch lands, second only to the immediate Tucson area. Still, the Tortolita Fan area ranks highest in cropland acreage at nearly 14,000 acres in cultivation, and it retains some 85,000 acres of ranch lands, nearly half of it State Trust lands along the eastern and western flanks of the Tortolita Mountains and to the west of the Santa Cruz River, and in Forest Service lands. Unlike the other subareas, ranch and agricultural lands here are fragmented and discontiguous, and represent what is left of a larger land use tradition. The grazing capacity here is 679 head of livestock or only about 3 percent of the entire eastern and western Pima County herd.

Conversion of ranch and crop lands is likely to continue with rising property values in the areas served by the incorporated towns of Oro Valley, Marana, and the City of Tucson. With flood control improvements that reduce the floodprone areas along the Santa Cruz River in Marana, it is also likely that croplands in the river floodplain will eventually become available for development. Additionally, more than 11,000 acres of ASLD grazing SLUPs have been reclassified for commercial uses, much of this land located along the I-10 corridor.

Given the current rate of urban expansion and growth in the Tortolita Fan, it is likely that the potential for future conservation of ranch lands is likely to be limited to the western portions of the Tortolita Mountain Fan and in portions of the Coronado National Forest.

The Middle Santa Cruz Valley

The Middle Santa Cruz Valley is, of course, the Tucson urban core, but surprisingly has retained some 55,000 acres of ranch lands, principally in the National Forest and nearly 18,000 acres of State Trust lands in the southeastern portion of the subarea.

At the present time, very limited portions of the Middle Santa Cruz Valley continue to support ranching operations. These include about 18,000 acres of State Trust lands currently leased for grazing as SLUPs in the southeastern portion of the valley, all of which has been reclassified for commercial use, and National Forest lands leased for grazing in the eastern Redington Pass area. Currently, approximately 666 head of livestock are permitted to graze on these leases or about 3 percent of the entire eastern and western livestock population.

Due to the ever-expanding Tucson metropolitan, only 15 percent of the valley is used for ranching including only 3,000 acres of private land. Assuming that the Middle Santa Cruz Valley will continue to experience urban expansion, this subarea has the very lowest potential for ranching to continue as a viable land use. The remaining private and State Trust lands will eventually be converted to commercial or residential development, and only the National Forest lands have any potential to remain in ranching use.

Conclusions

The foregoing discussion has attempted to clarify and quantify ranching as a land use in Pima County and to characterize its extent, capacity, threats, and potential for conservation in each of the subareas, excluding tribal lands.

The findings have shown that the Altar, Empire-Cienega, Upper Santa Cruz, and San Pedro valleys, and the Ironwood National Monument area of the Avra Valley have the greatest extent, productivity, and potential for continued and sustainable ranching use. Together, these valleys constitute about 90 percent of the ranch lands in eastern Pima County and about 80 percent of all 1.6 million acres of ranch lands in eastern and western Pima County. The integrity of natural open space used for grazing is also supported by the connectivity of ranch lands in these eastern Pima County valleys. The mosaic of private, State Trust, BLM, and Forest lands that comprise these grazing lands provides a set of interconnected expanses that total more than 1.3 million acres.

As for livestock capacity and productivity, these same eastern valleys support 18,000 head of livestock or about 93 percent of the entire livestock population of eastern Pima County, currently estimated at about 19,300 animals.

A portion of Western Pima County is also likely to continue in ranching use because virtually all the land is managed by the BLM and because there is very low development pressure.

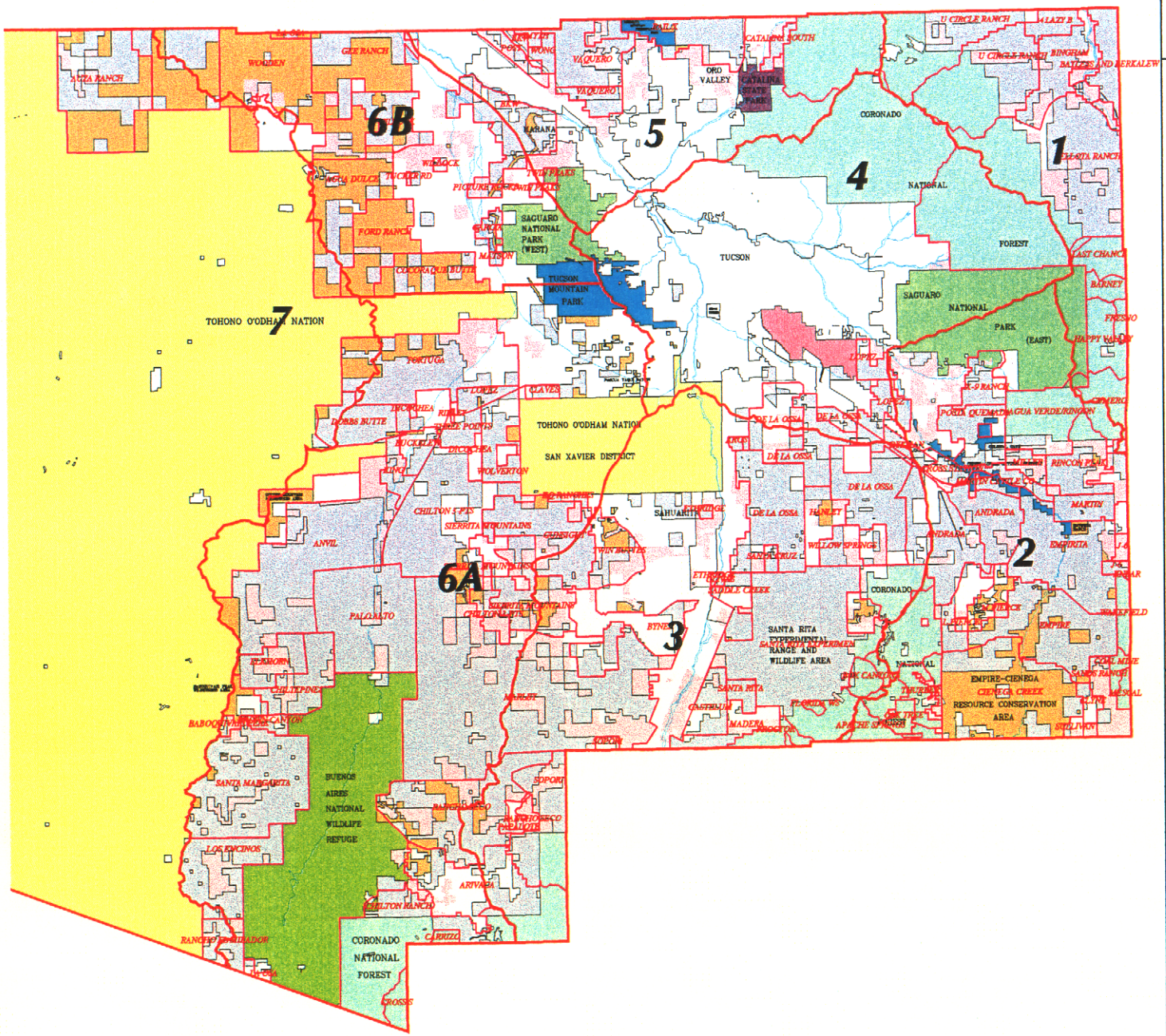
This area of about 175,000 acres comprises some 11 percent of all ranch lands in the county, but only supports about 600 head of livestock or 3 percent of the entire county livestock population of 19,905 animals.

Both the Middle Santa Cruz Valley and the Tortolita Fan are experiencing significant development pressure and conversion of private and State lands to real estate development. Consequently, it is highly improbable that ranching as a viable and sustainable land use will continue in these valleys. Should these lands be totally converted to urban uses, there would be a loss of nearly 140,000 acres or10 percent of eastern Pima County's ranch lands, and a 6 percent decline in livestock capacity.

As for the future potential for ranch conservation, it has been discussed how the most significant threat to this potential is the eventual conversion of State Trust grazing lands to commercial and residential uses. At the present time, State Trust lands comprise more than 51 percent of all ranch lands, or about 820,000 acres. In anticipation of growth in proximity to the urban core and in areas with rising land values, about 53,000 acres of State Trust lands are currently reclassified for commercial sale or lease. When disposable BLM lands and interspersed private lands are also considered, it may be estimated that 88,000 acres of current ranch lands could be converted to other uses, and all of the valleys, with the exception of the San Pedro Valley, are affected. Of the most productive ranching valleys, the Upper Santa Cruz currently has the highest development pressure from State Trust land conversions.

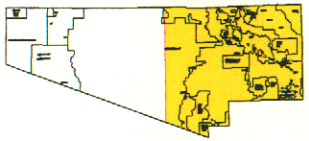
To conclude, the Altar, Empire-Cienega, Upper Santa Cruz, San Pedro, and Avra valleys currently have the highest extent, capacity, and potential for ranch conservation. However, ranching today is currently most secure in the San Pedro Valley and in the Ironwood National Monument portion of the Avra Valley because of the lack of disposable BLM and State Trust lands.

Pima County Ranches



- 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

Pima County Index Map



Index Map Scale 1:1,500,000

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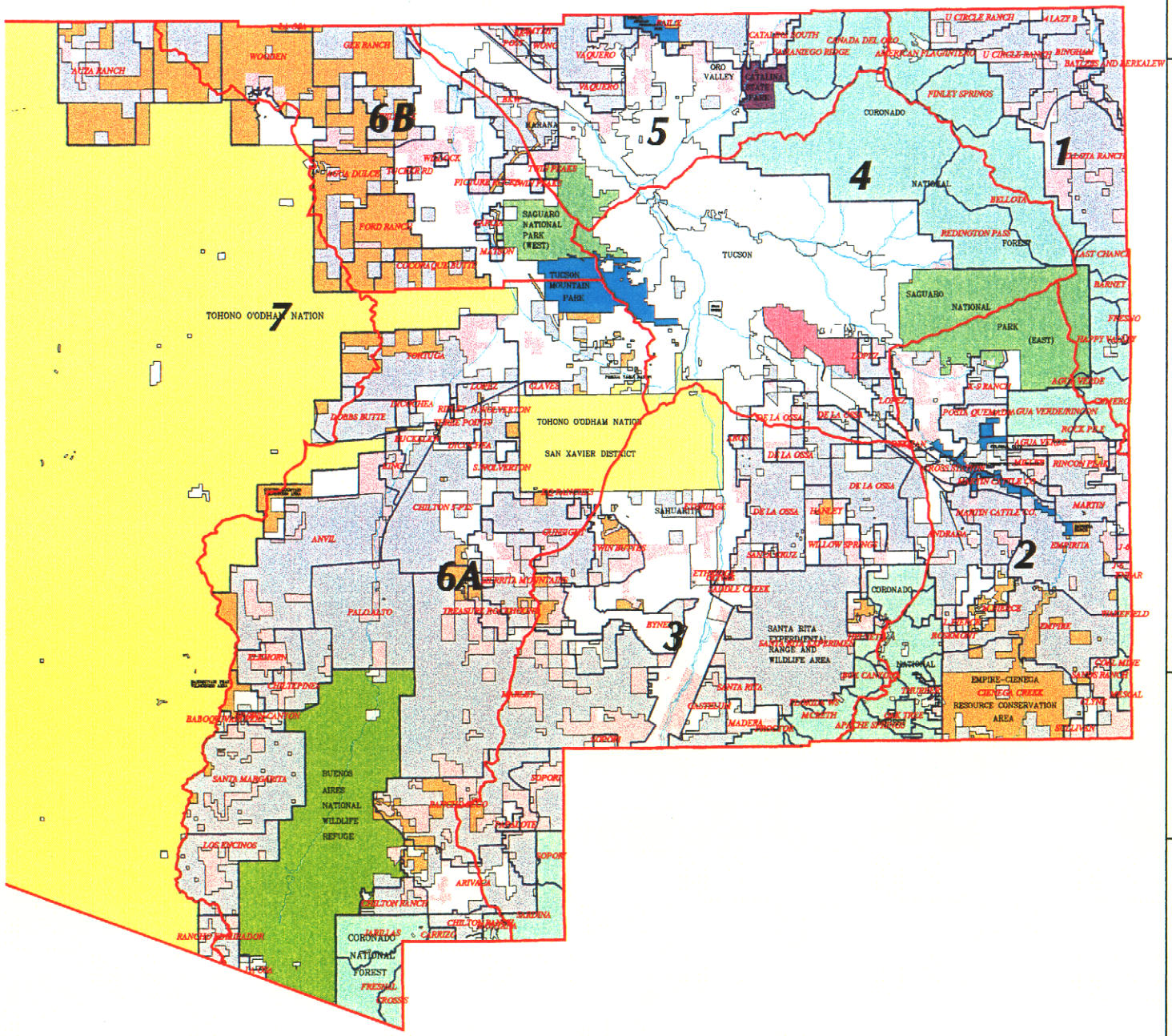
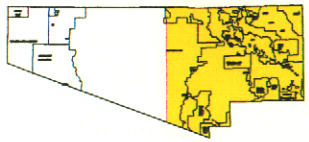
/pygmyowl2/sonora/cultural/asmjoined/plan_all/amls/ranch_bnds.aml 6/19/00

Ranch Lands and Grazing Allotments



- 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

Pima County Index Map



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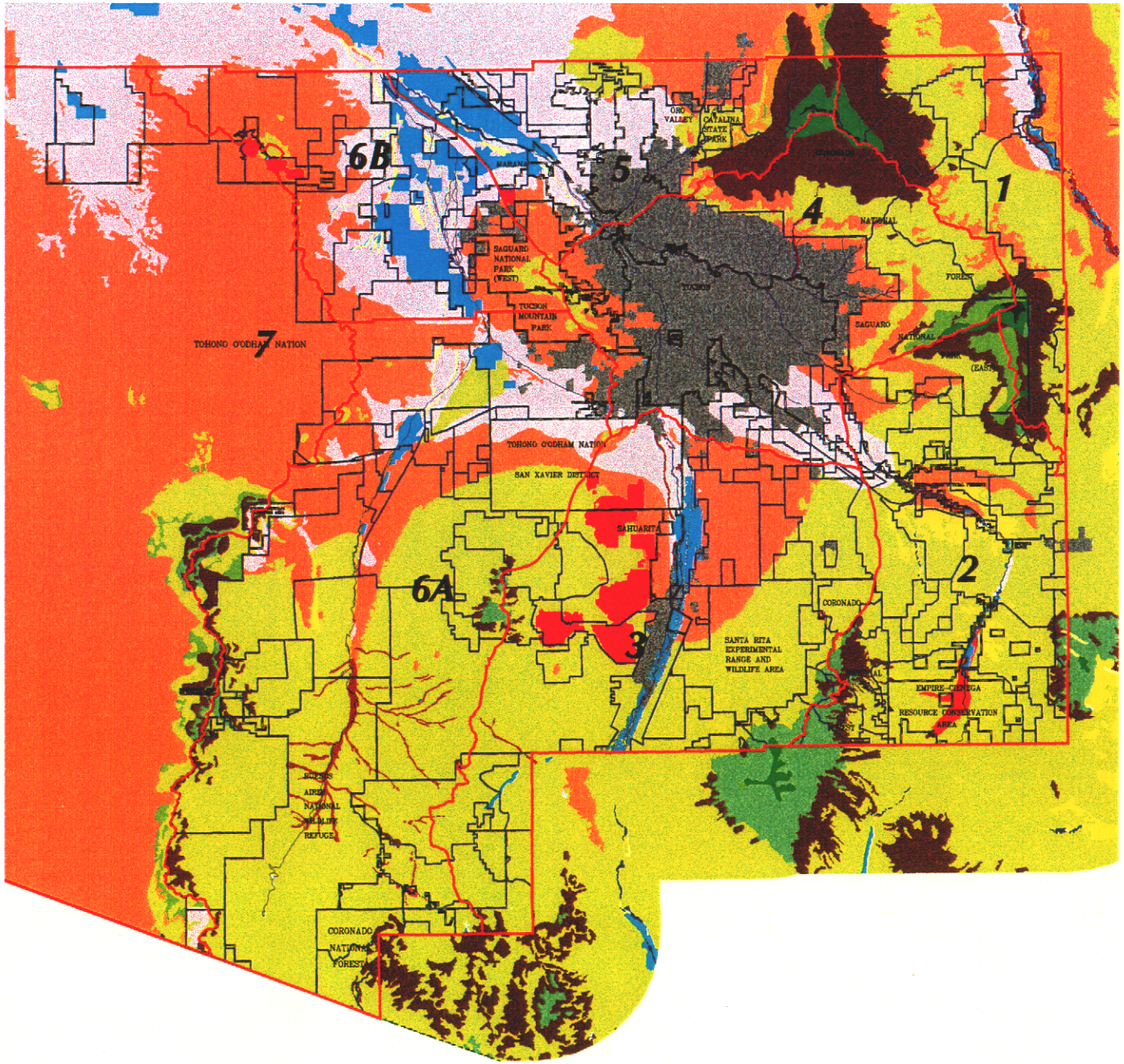
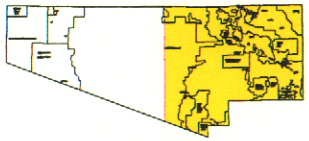
GAP Vegetation and Grazing Allotments



- Watershed Planning Unit Boundary
- Grazing Allotments
- Administrative Boundaries
- Washes
- Agriculture
- Urban
- Mining
- Chihuahuan Desertscrub (Creosotebush--Tarbush)
- Chihuahuan Desertscrub (Mixed Scrub)
- Chihuahuan Desertscrub (Whitethorn)
- Madrean Evergreen Forest (Encinal)
- Madrean Evergreen Forest (Oak--Pine)
- Madrean Montane Conifer Forest (Douglas-Fir--Mixed Conifer)
- Madrean Montane Conifer Forest (Pine)
- Mogollon Chaparral Scrubland (Manzanita)
- Mogollon Chaparral Scrubland (Mixed Evergreen Sclerophyll)
- Mogollon Deciduous Swampforest (Cottonwood--Willow)
- Mogollon Deciduous Swampforest (Mixed Broadleaf)
- Playa
- Scrub Grassland (Mixed Grass--Scrub)
- Scrub Grassland (Sacaton--Scrub)
- Sonoran Deciduous Swamp and Riparian Scrub (Mixed Scrub)
- Sonoran Desertscrub (Creosotebush--Bursage)
- Sonoran Desertscrub (Paloverde--Mixed Cacti)
- Sonoran Desertscrub (Saltbush)
- Sonoran Interior Marshland (Cattail)
- Sonoran Riparian and Oasis Forest (Cottonwood--Willow)
- Unclassified/Mixed
- Water

Pima County Index Map



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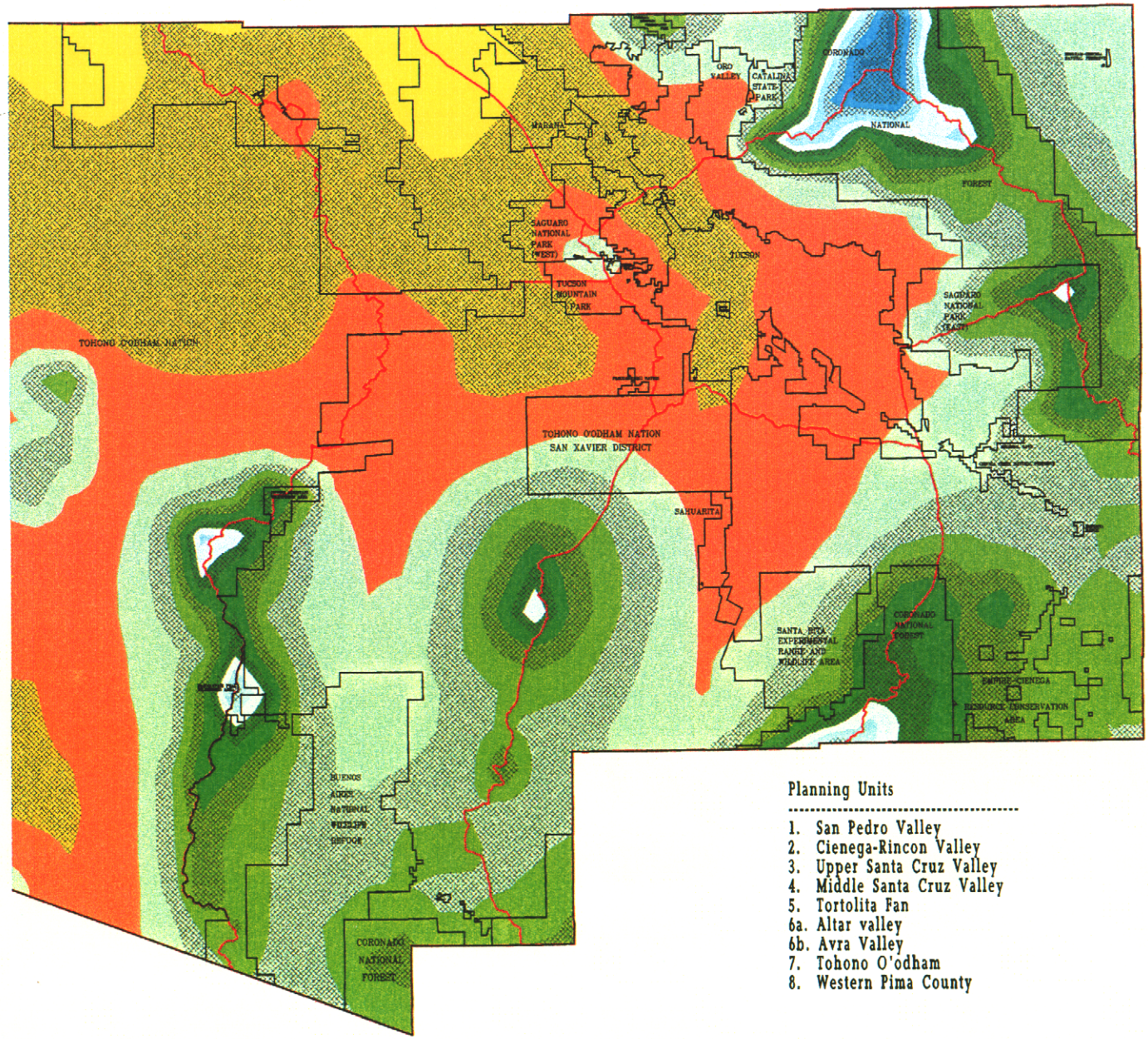
/pysnyow12/sonora/cultural/esmjoined/plan_all/covers/ranch_gape.aml 6/19/00

Precipitation Within Eastern Pima County

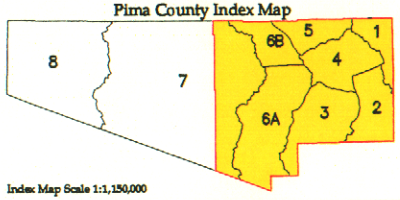


Planning Units

1. San Pedro Valley
2. Cienega-Rincon Valley
3. Upper Santa Cruz Valley
4. Middle Santa Cruz Valley
5. Tortolita Fan
6a. Altar valley
6b. Avra Valley
7. Tohono O'odham
8. Western Pima County

- 5 Inches
- 7
- 9
- 11
- 13
- 15
- 17
- 19
- 21
- 23
- 25
- 27
- 29
- 31
- 33
- 35
- 37
- Watershed Planning Unit Boundary
- Administrative Boundaries

Pima County Index Map



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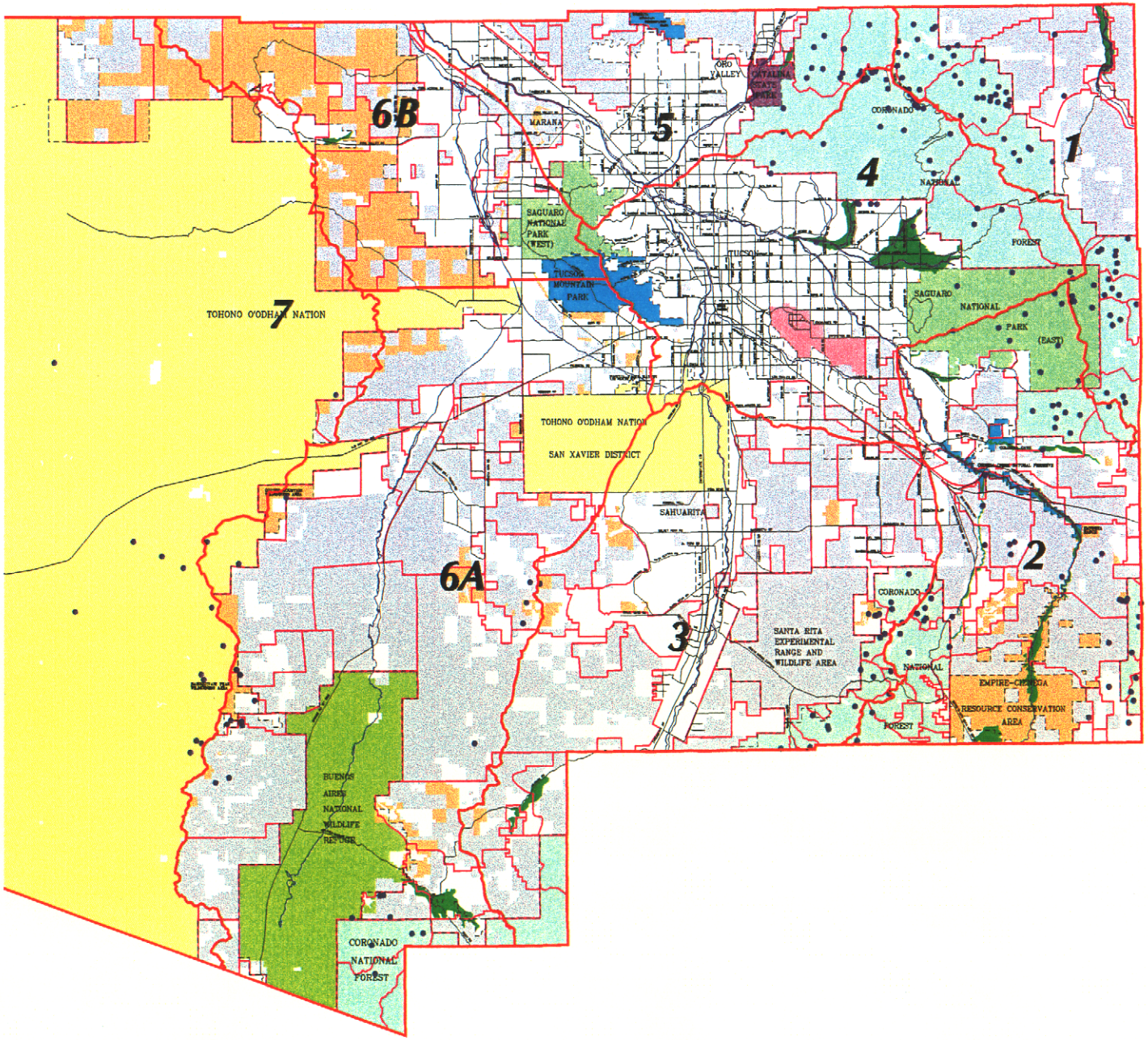
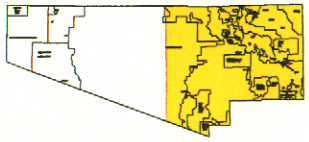
/pygayow12/sonora/cultural/asmipined/plan_all/covers/rain_ppc.aml Plotted: 6/29/00

Major Washes, Springs and Shallow Ground Water



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

Pima County Index Map



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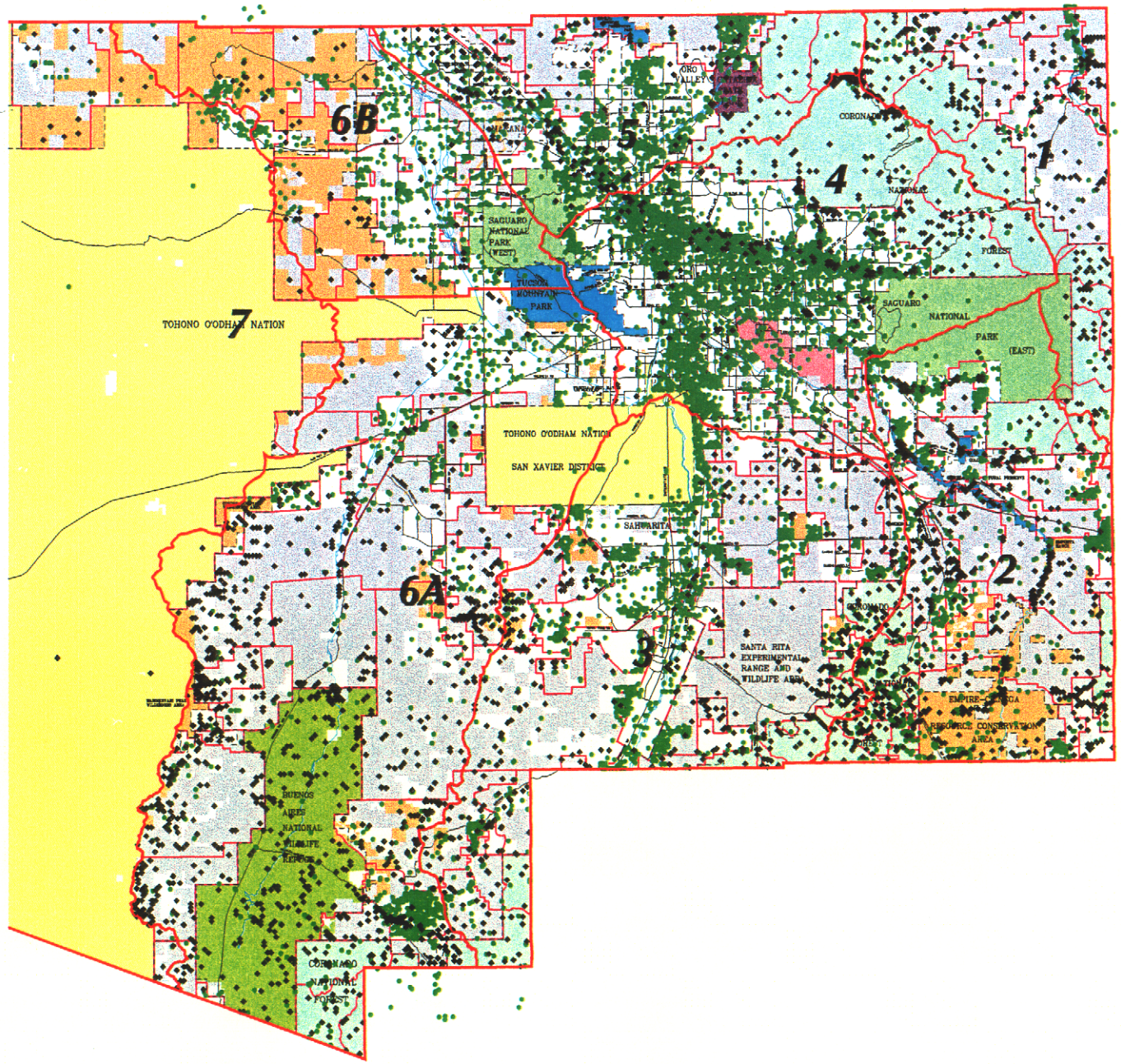
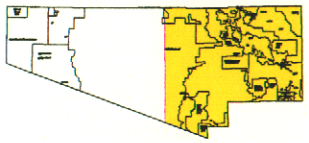
Stock Tanks and Well Sites



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

Pima County Index Map



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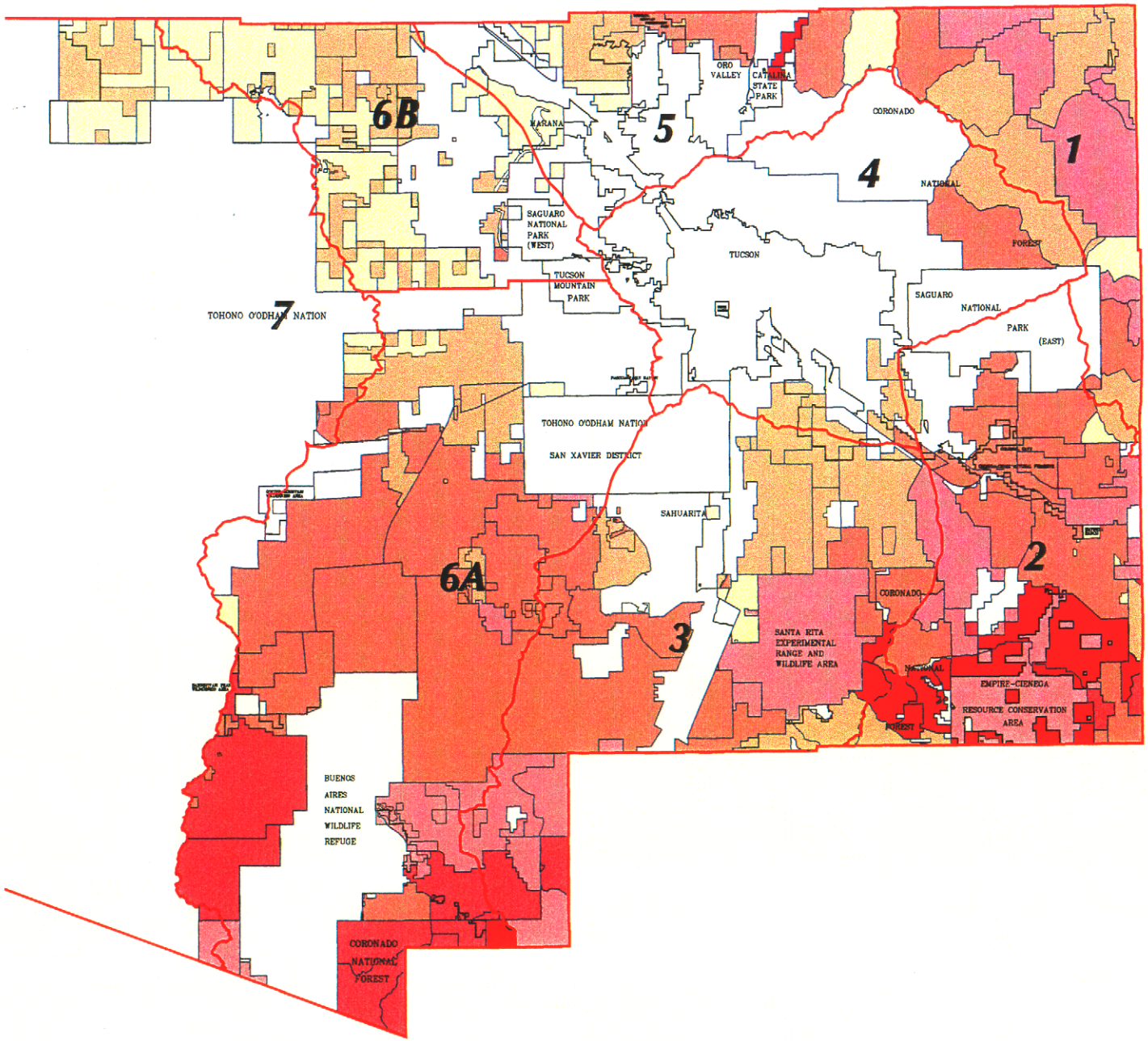
/pygmyowl2/sonora/cultural/asmjoined/plan_all/amls/ranch_tanks.aml 6/15/00

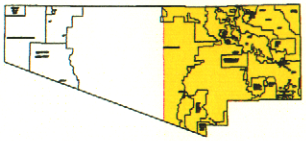
Carrying Capacity per Square Mile by Grazing Allotment



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

Pima County Index Map



Index Map Scale 1:1,500,000

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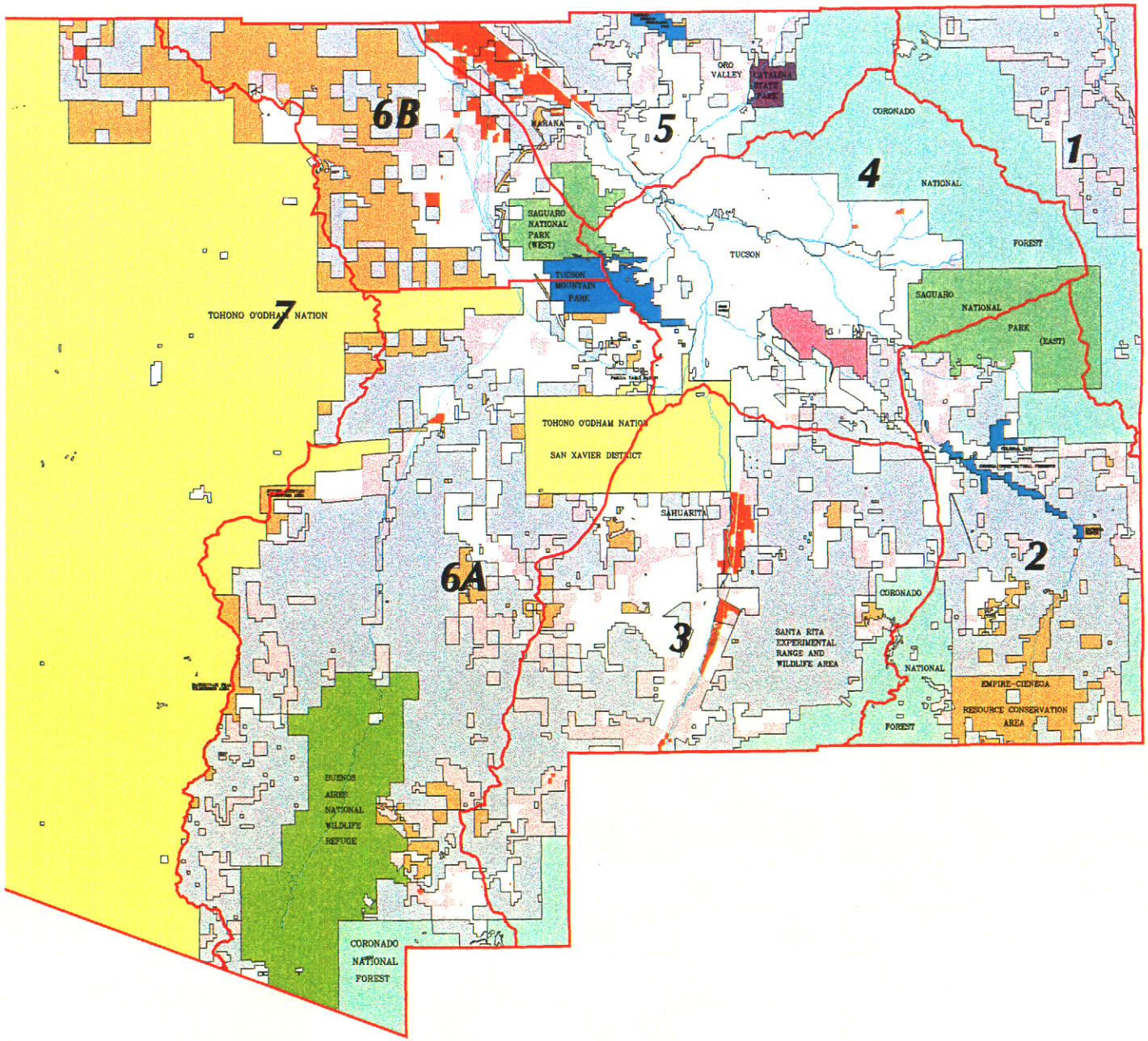
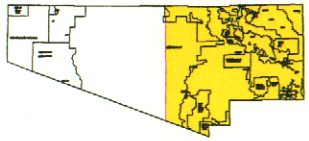
/pygmyowl2/sonora/cultural/asmjoined/plan_all/amls/ranch_carrys.aml Plotted: 6/20/00

Agricultural Lands



- 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

Pima County Index Map



Index Map Scale 1:1,500,000

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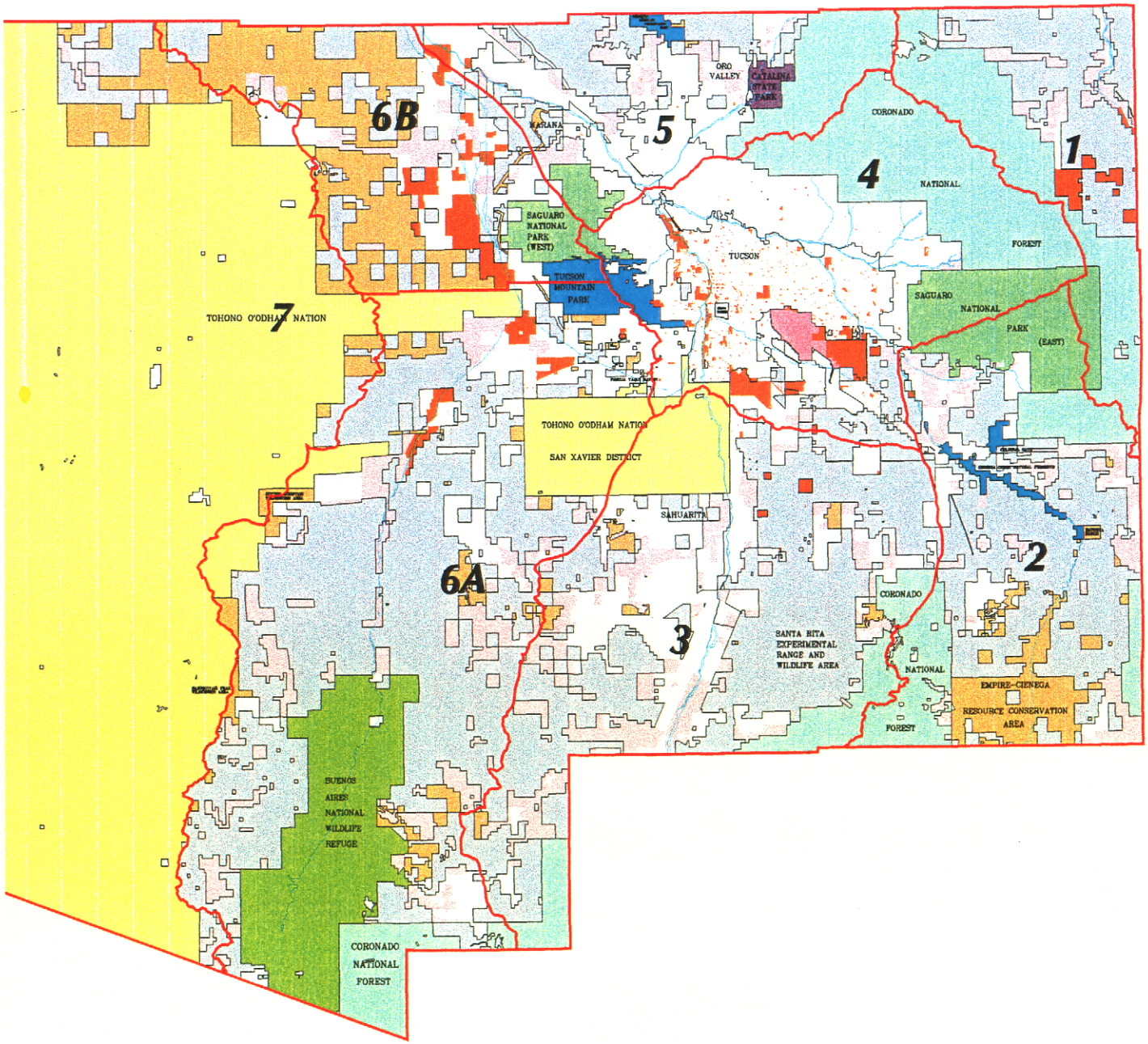
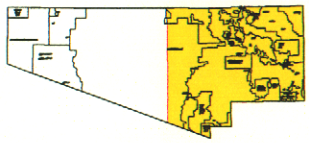
/pyg@myowl2/sonora/cultural/asmjoined/plan_all/amls/ranch_age.aml 6/20/00

City of Tucson Owned Parcels



- Planning Unit Boundary
- Major Washes
- City of Tucson Parcels
- 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

Pima County Index Map



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SEAL OF PIMA COUNTY ARIZONA

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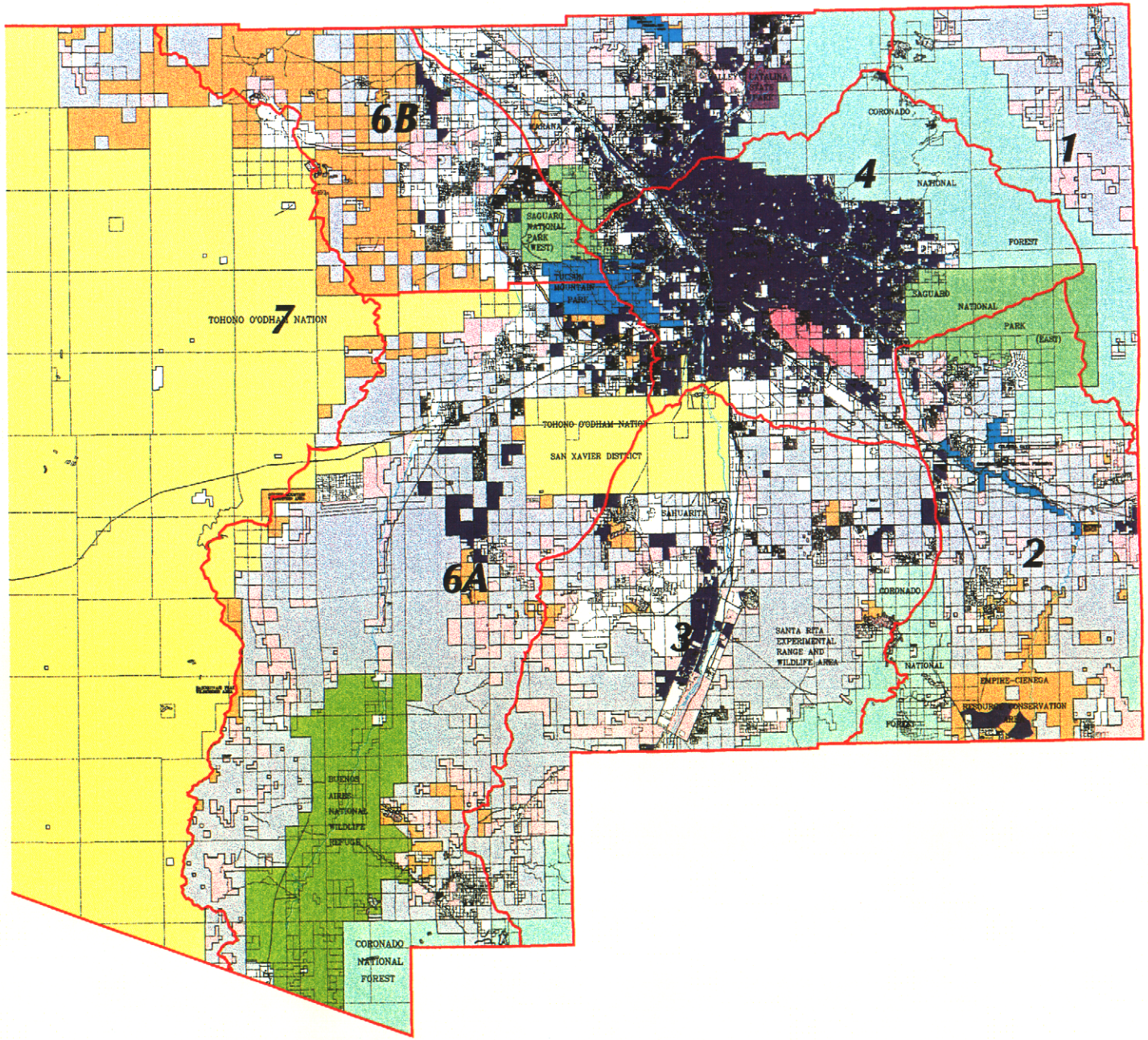
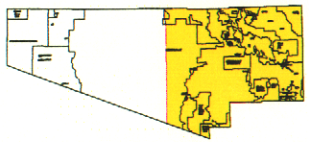
Platted Subdivisions



- 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

Pima County Index Map



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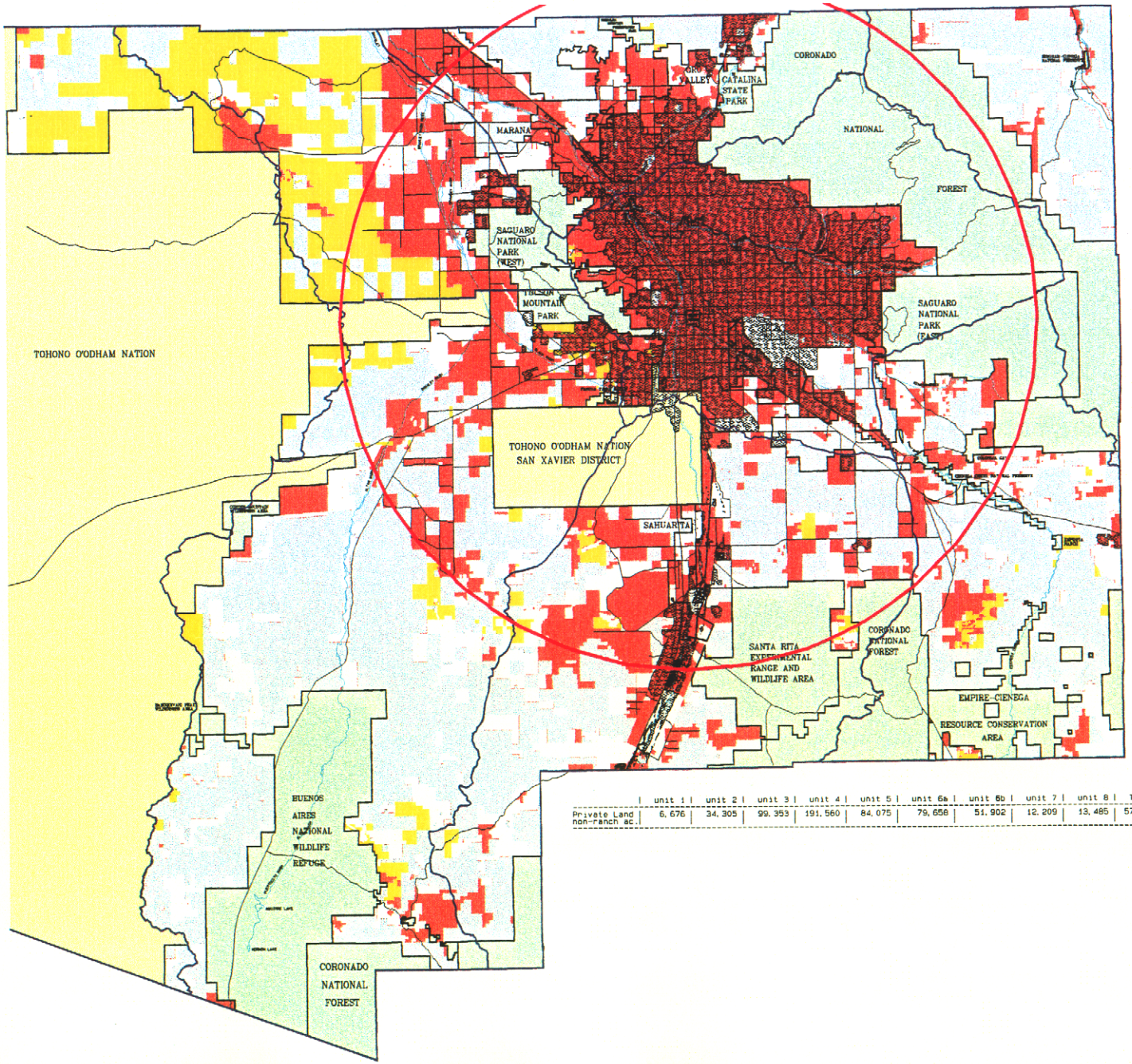
/pydeydwl2/sonora/cultural/esnjoined/plan_all/emls/ranch_subd.eml 6/20/00

Urban Land and Private Land Not Used for Ranching, June 2000.



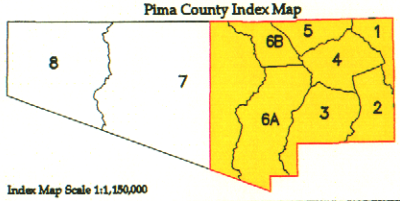
	unit 1	unit 2	unit 3	unit 4	unit 5	unit 6a	unit 6b	unit 7	unit 8	TOTAL
Private Land non-ranch ac.	6,676	34,305	99,353	191,560	84,075	79,658	51,902	12,209	13,485	573,223

- 25 Mile Radius From I-10 and I-19
- Urban Area from GAP Vegetation Data
- Private Land
- State Trust Land
- BLM Land
- National Parks/Monuments/Preserves
- Tribal Nations
- Private Land - Ranch Use
- Major Washes
- Major Roads
- Planning Unit Boudaries

Planning Units

1. Middle San Pedro (174,314 ac.)
2. Cienega-Rincon (318,535 ac.)
3. Upper Santa Cruz (449,684 ac.)
4. Middle Santa Cruz (361,851 ac.)
5. Tortolita Fan (203,546 ac.)
6. Avra-Altar
   A. Altar valley (713,807 ac.)
   B. Avra Valley (221,404 ac.)
7. Tohono O'odham (2,354,910 ac.)
8. Western Pima County (1,082,281 ac.)

Pima County Index Map



Index Map Scale 1:1,150,000

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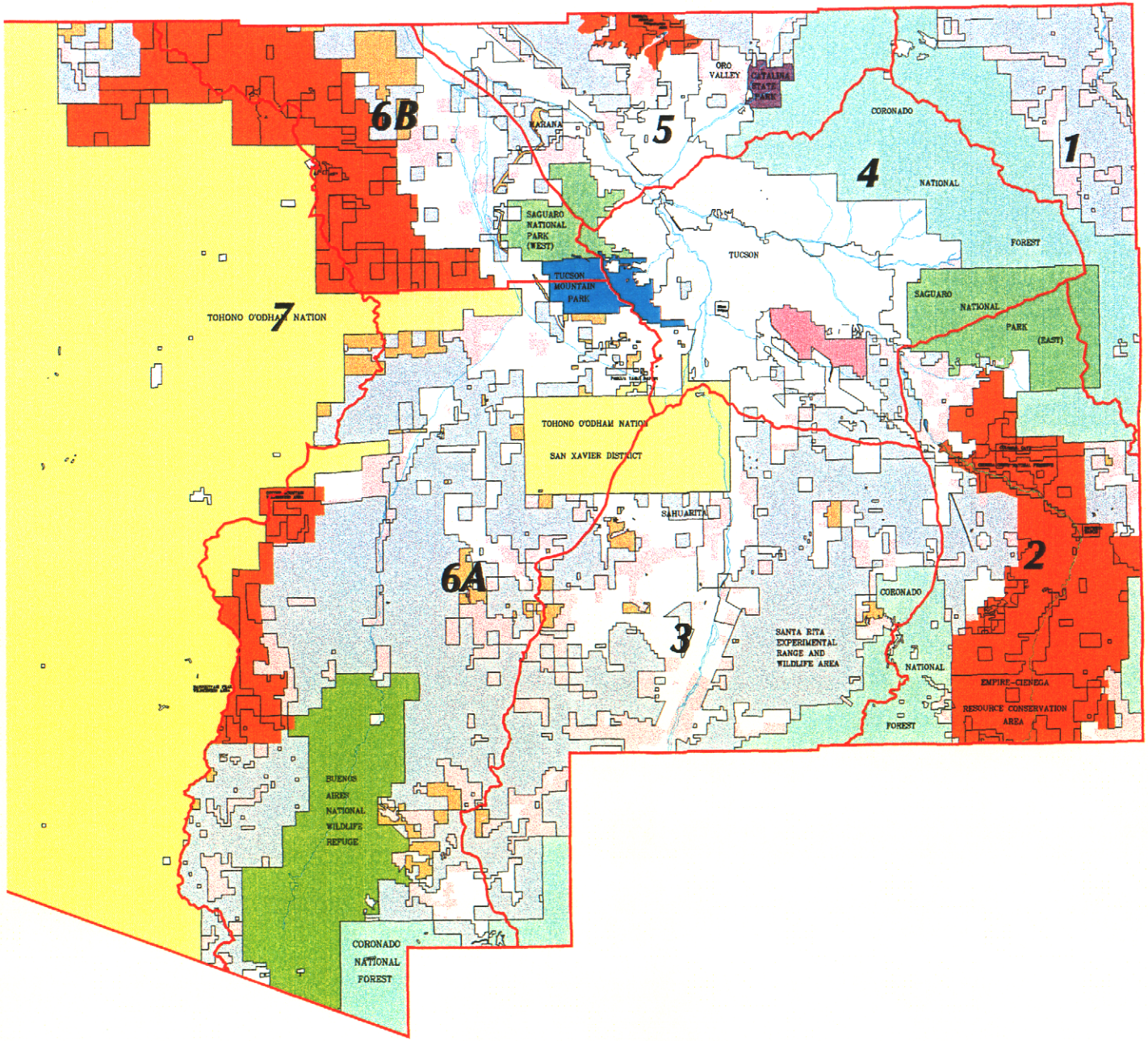
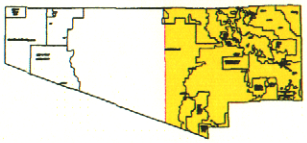
/pygayowl2/sonora/cultural/asmjoined/plan_all/amls/urb25r_le.aml Plotted: 6/28/00

BLM Long Term Management Lands



- 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

Pima County Index Map



Inset Map Scale 1:1,500,000

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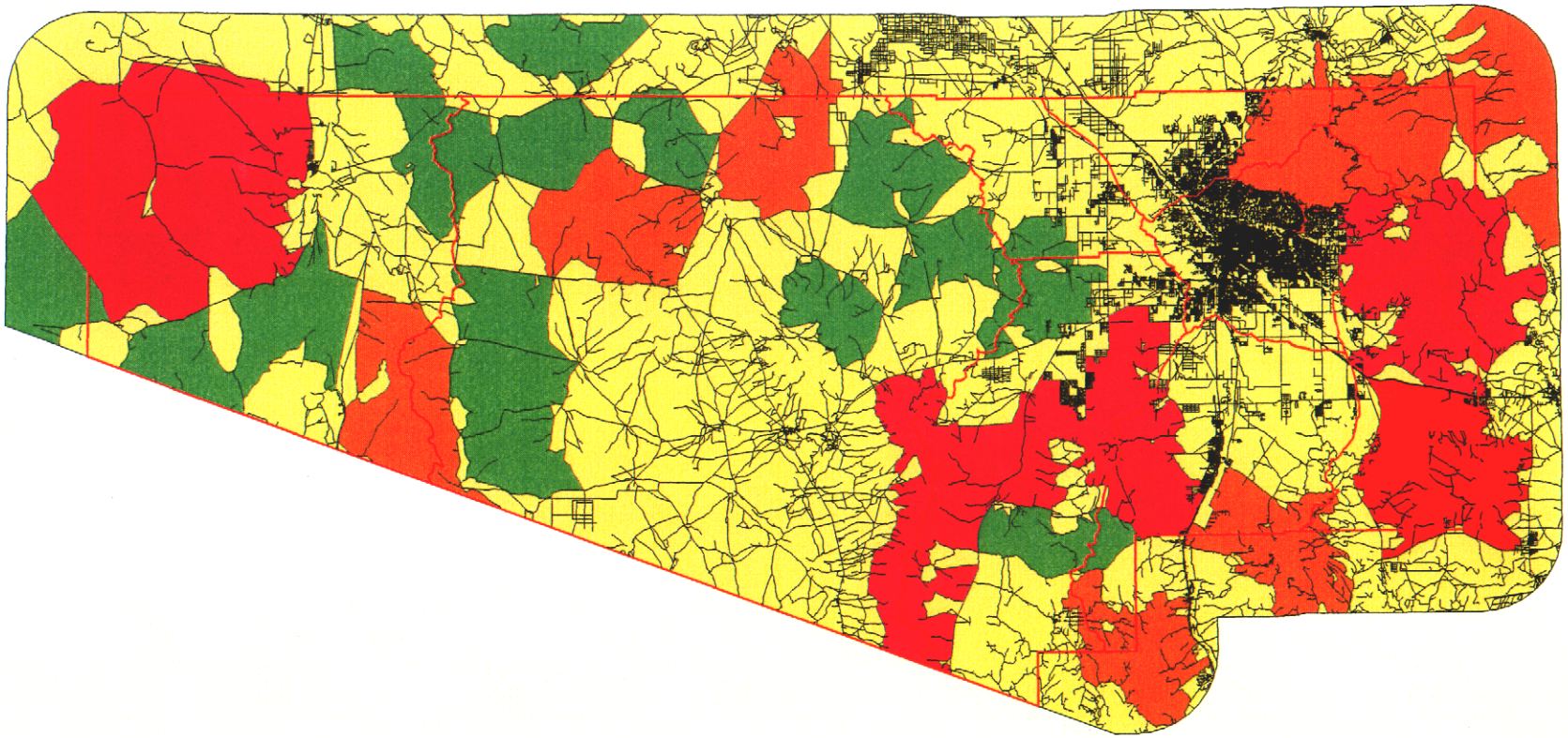
/pycmyow12/sonora/cultural/esmejoined/plan_all/amls/ranch_acres.aml 6/20/00

Roadless Acres in Pima County



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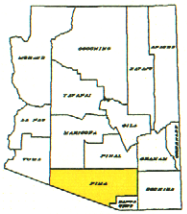
- 200 Series - 55647 to 111295 Ac.
- 300 Series - 111296 to 166938 Ac.
- 400 Series - 166939 to 222584 Ac.
- 500 Series - 222585 to 278239 Ac.

State Of Arizona Index Map



Index Map Scale 1:5,000,000

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Scale 1: 300,000

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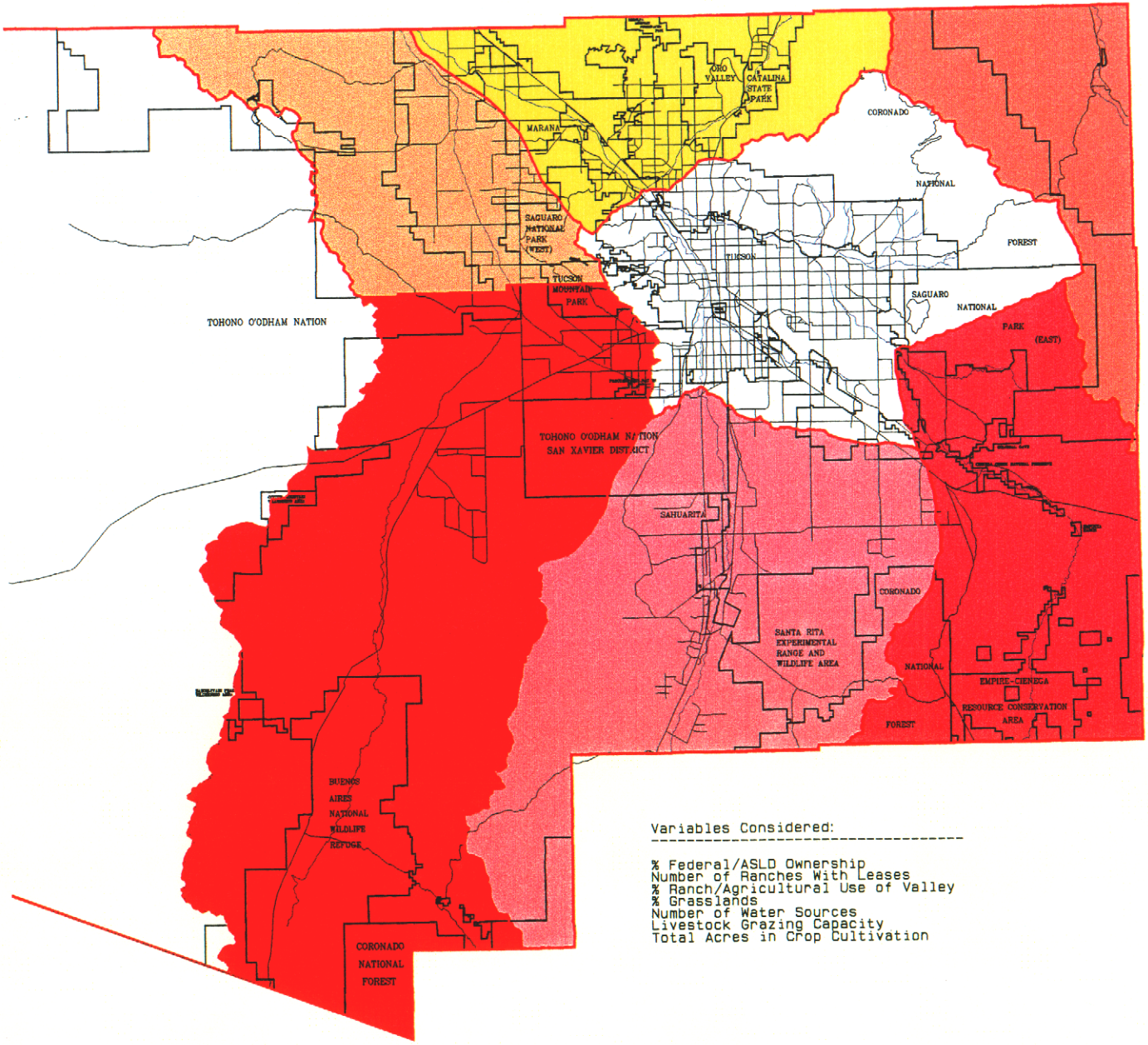
Plotted: 6/16/00

Extent of Ranching in Eastern Pima County



Variables Considered:

% Federal/ASLD Ownership
Number of Ranches With Leases
% Ranch/Agricultural Use of Valley
% Grasslands
Number of Water Sources
Livestock Grazing Capacity
Total Acres in Crop Cultivation

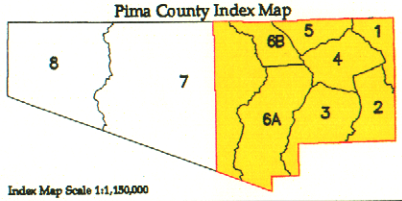
Highest Ranching & Agricultural Land Use

- 1 Altar Valley
- 2 Empire-Cienega Valley
- 3 Upper Santa Cruz Valley
- 4 San Pedro Valley
- 5 Avra Valley
- 6 Tortolita Fan
- 7 Western Pima County
- 8 Middle Santa Cruz Valley

Planning Units

1. San Pedro Valley
2. Cienega-Rincon Valley
3. Upper Santa Cruz Valley
4. Middle Santa Cruz Valley
5. Tortolita Fan
6a. Altar valley
6b. Avra Valley
7. Tohono O'odham
8. Western Pima County

Pima County Index Map



Index Map Scale 1:1,150,000

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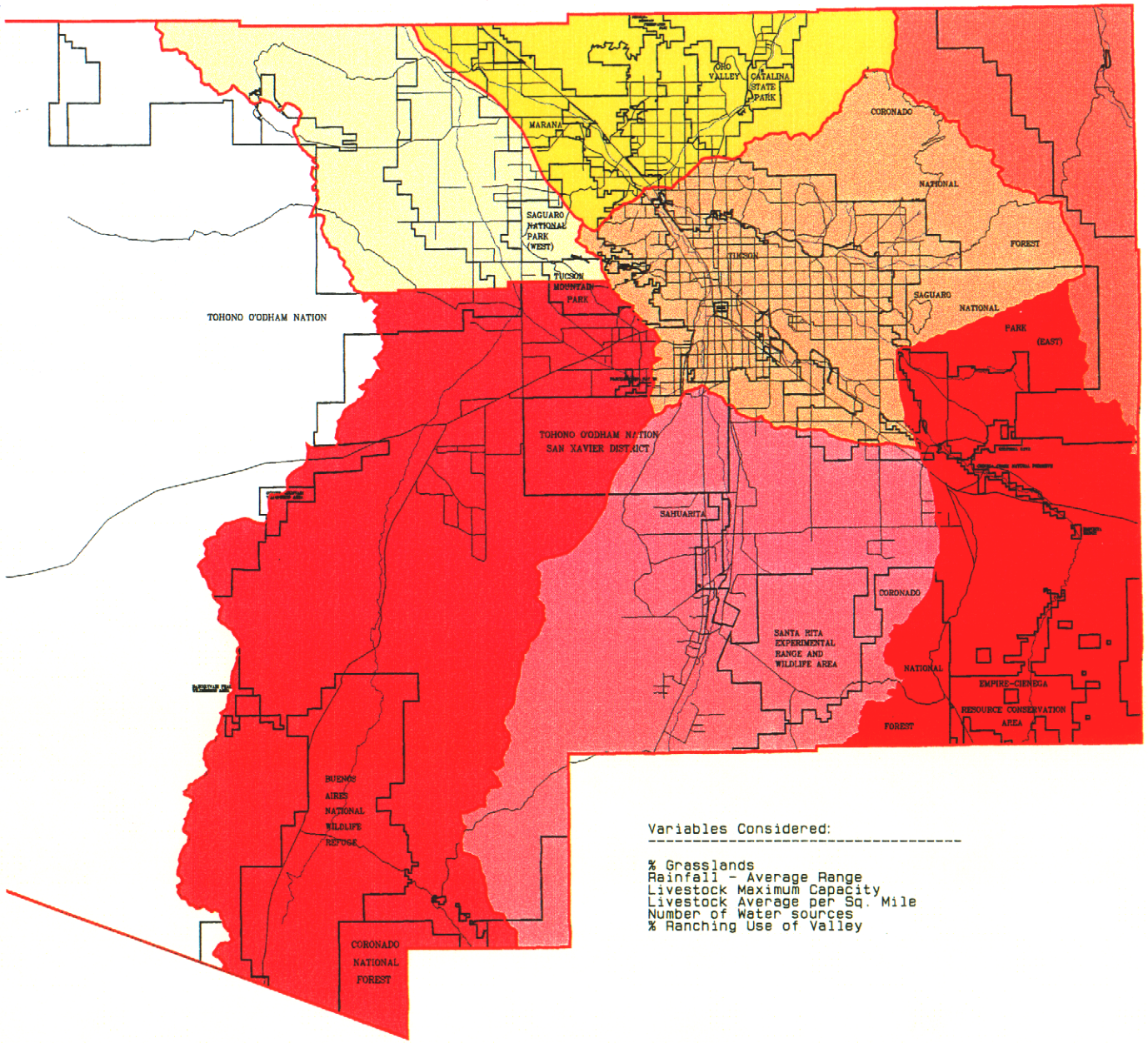
/pyg@yowl2/sonora/cultural/asnjoined/plan_all/amls/ranch_ppc.aml 6/29/00

Livestock Grazing Capacity



Variables Considered:

% Grasslands
Rainfall - Average Range
Livestock Maximum Capacity
Livestock Average per Sq. Mile
Number of Water sources
% Ranching Use of Valley

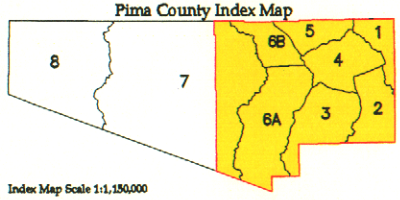
Highest Livestock Grazing Capacity

- 1 Empire-Cienega Valley
- 2 Altar Valley
- 3 Upper Santa Cruz Valley
- 4 San Pedro Valley
- 5 Middle Santa Cruz Valley
- 6 Tortolita Fan
- 7 Avra Valley
- 8 Western Pima County

Planning Units

1. San Pedro Valley
2. Cienega-Rincon Valley
3. Upper Santa Cruz Valley
4. Middle Santa Cruz Valley
5. Tortolita Fan
6a. Altar valley
6b. Avra Valley
7. Tohono O'odham
8. Western Pima County

Pima County Index Map



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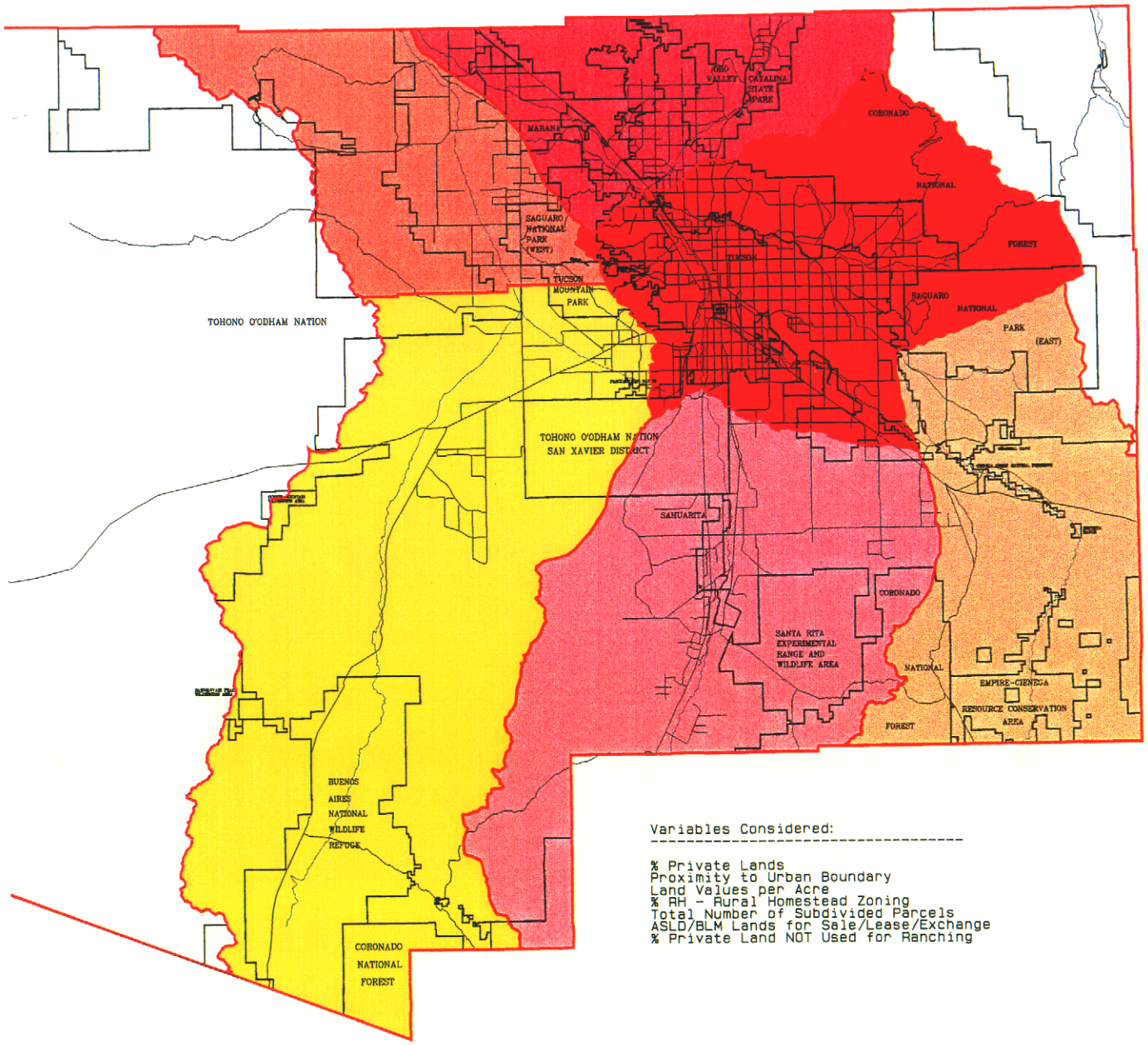
/pgsmyovl2/sonora/cultural/esmjoined/plan_all/amls/graz_spc.aml 6/29/00

Threats to Ranching/Agricultural Land Use



Variables Considered:

% Private Lands
Proximity to Urban Boundary
Land Values per Acre
% RH - Rural Homestead Zoning
Total Number of Subdivided Parcels
ASLD/BLM Lands for Sale/Lease/Exchange
% Private Land NOT Used for Ranching

Highest Threat to Ranching/Agricultural Land Use

- 1 Middle Santa Cruz Valley
- 2 Tortolita Fan
- 3 Upper Santa Cruz Valley
- 4 Avra Valley
- 5 Empire-Cienega Valley
- 6 Altar Valley
- 7 Western Pima County
- 8 San Pedro Valley

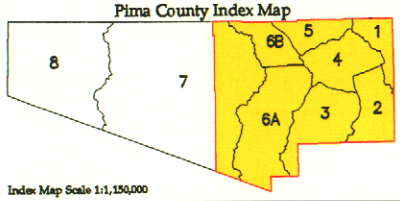
Planning Units

1. San Pedro Valley
2. Cienega-Rincon Valley
3. Upper Santa Cruz Valley
4. Middle Santa Cruz Valley
5. Tortolita Fan

6a. Altar valley
6b. Avra Valley

7. Tohono O'odham
8. Western Pima County

Pima County Index Map



Index Map Scale 1:1,150,000

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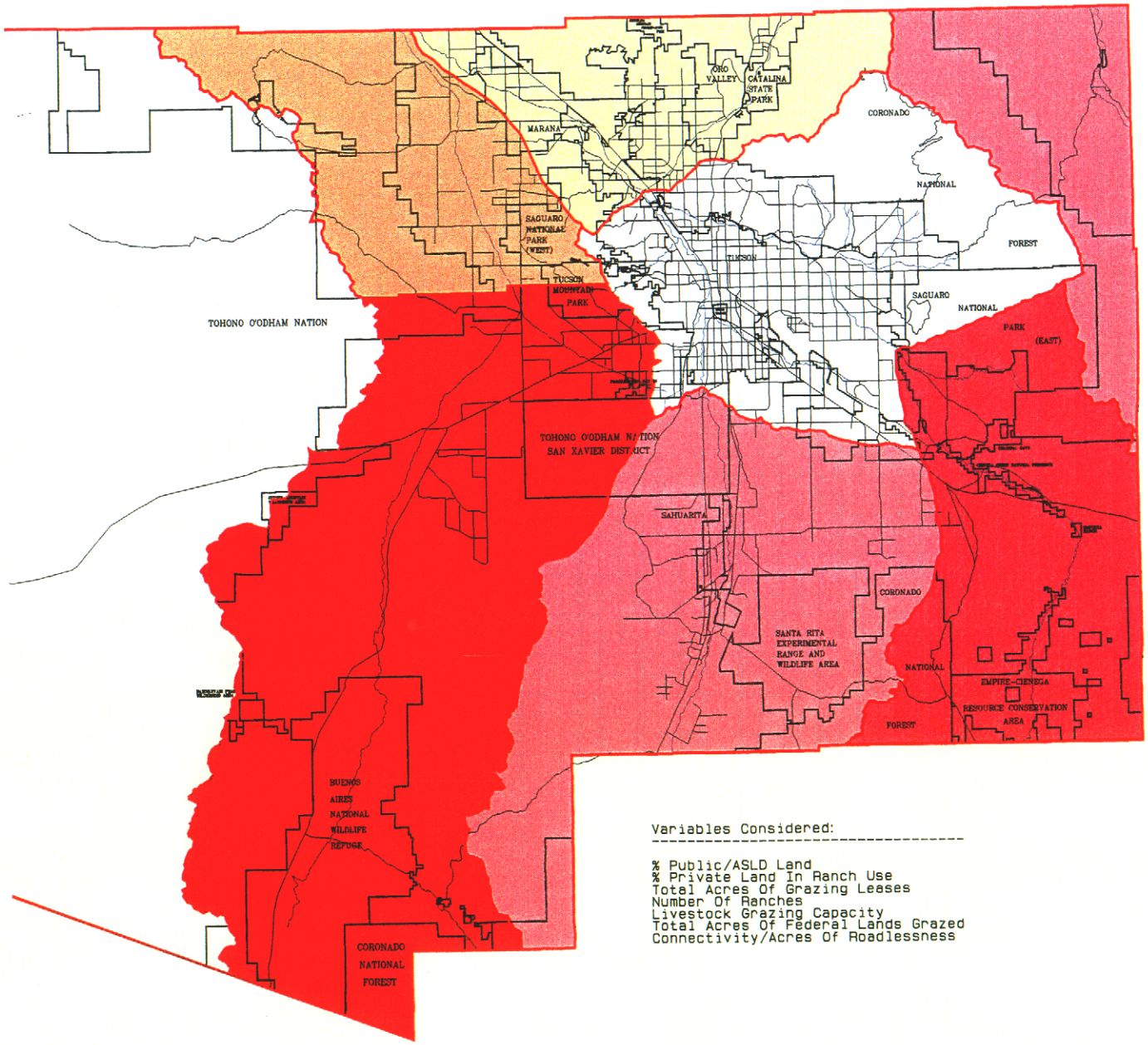
/pygmyowl2/sonora/cultural/asmjoined/plan_all/amls/ag_spc.aml 8/29/00

Ranch Land Conservation



Variables Considered:

% Public/ASLD Land
% Private Land In Ranch Use
Total Acres Of Grazing Leases
Number Of Ranches
Livestock Grazing Capacity
Total Acres Of Federal Lands Grazed
Connectivity/Acres Of Roadlessness

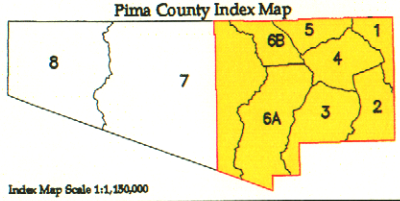
Highest Potential for Ranch Land Conservation

- 1 Altar Valley
- 2 Empire-Cienega Valley
- 3 Upper Santa Cruz Valley
- 3 San Pedro Valley
- 4 Western Pima County
- 5 Avra Valley
- 6 Tortolita Fan
- 7 Middle Santa Cruz Valley

Planning Units

1. San Pedro Valley
2. Cienega-Rincon Valley
3. Upper Santa Cruz Valley
4. Middle Santa Cruz Valley
5. Tortolita Fan
6a. Altar valley
6b. Avra Valley
7. Tohono O'odham
8. Western Pima County

Pima County Index Map



Index Map Scale 1:1,150,000

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/pygmyowl2/sonora/cultural/esajoined/plan_all/amls/cons_ppc.aml 5/29/00

VII. Recommendations for Ranch Land Conservation

By changing the perspective of land use goals – from accommodating growth wherever it happens to deciding first where natural open space should be retained, multiple conservation goals can be achieved, and growth can be accommodated in areas where conservation goals are not best served. In the broadest sense, the biological, riparian, cultural, and ranch conservation elements of the Sonoran Desert Conservation Plan will become the framework for integrating multiple conservation goals into Pima County's land use planning and development process, and result in the issuance of a Section 10 permit under the Endangered Species Act and the implementation of a habitat conservation plan. The natural open space provided by ranch lands and preserves like Saguaro National Park and the Ironwood National Monument will, of course, become the very basis for this conservation planning.

Preliminary reserve design guidelines for the biological element prepared by RECON and the Science Technical Advisory Team suggest the following guidelines for the biological element that have implications for the ranch element as well:

- comprehensive conservation - broad distribution of species across native ranges
- maximum "patch" size - larger habitat reserves are better
- adjacency/proximity - large blocks of habitat that are closer together are better
- contiguousness - unfragmented habitat is better than isolated or fragmented land
- connectivity - interconnected blocks of habitat are better than isolated blocks
- diversity - reserves should have diverse physical and environmental conditions
- intactness - ecosystem function is enhanced by few impacts from exotic species
- roadlessness - habitat that is not accessible by human disturbance is better
- priority - identify the most vulnerable components of the reserve design for action
- opportunism - opportunities to build on the existing reserve system
- realism - consider existing and proposed land uses, land values, and parcel size

Given these biological guidelines, it becomes clear that the conservation of ranch lands will play a critical role in meeting biological conservation goals as well as ranch conservation goals. The very qualities of extensiveness, adjacency, landscape diversity, connectivity, lack of fragmentation and urbanization, and roadlessness that serve biological goals also characterize the ranch lands with the highest potential for conservation.

Therefore, for the purposes of meeting a maximum of conservation goals - biological, ranching, cultural – the following alternative recommendations will similarly consider first the maximum extent of all current ranch lands and secondly the extent of ranch lands should land use conversions occur.

These alternatives are presented as conceptual ranch conservation strategies for the purposes of discussion, but it is also recognized that the same biological principle of "larger and connected is better than smaller and isolated" also pertains to the functioning and productivity of ranching, and it helps to maintain the integrity, scope, and economic viability of the local ranching industry.

VII-1. Alternative 1 - Conserve Current Ranch Lands to Define the Urban Core

In this concept, all current and existing ranch lands are conserved, and the "urban core" may be considered to be defined by the boundaries of contiguous federal and State Trust grazing leases that support viable ranching operations. This approach to ranch conservation design simply acknowledges today's reality of the extent of ranching – where public and private ranch lands used for ranching provide the transition from a rural working landscape to where development is focused today in the urban core.

Rather than consider this concept a set urban boundary, this reflects, in fact, a transition area, and it should not be considered a hard edge. Because grazing lease areas are typically comprised of State Trust, BLM, and private lands, it is possible for some of those private lands to be converted to other uses while the surrounding public lands remain in ranching use, and this is, in fact, what has happened within many of the grazing lease areas within the 25 mile radius of the urban core.

Grazing lease boundaries can, nonetheless, provide a conceptual design for defining ranch conservation and the metropolitan area. When mapped and analyzed, this reality of how grazing leases define the urban core reveals both the extent of viable ranching areas and natural preserves and the extent of private lands either developed or potentially available for development. The following table and accompanying figure reveal one alternative to define ranch conservation and the possible extent of the Tucson metropolitan area by using grazing lease boundaries.

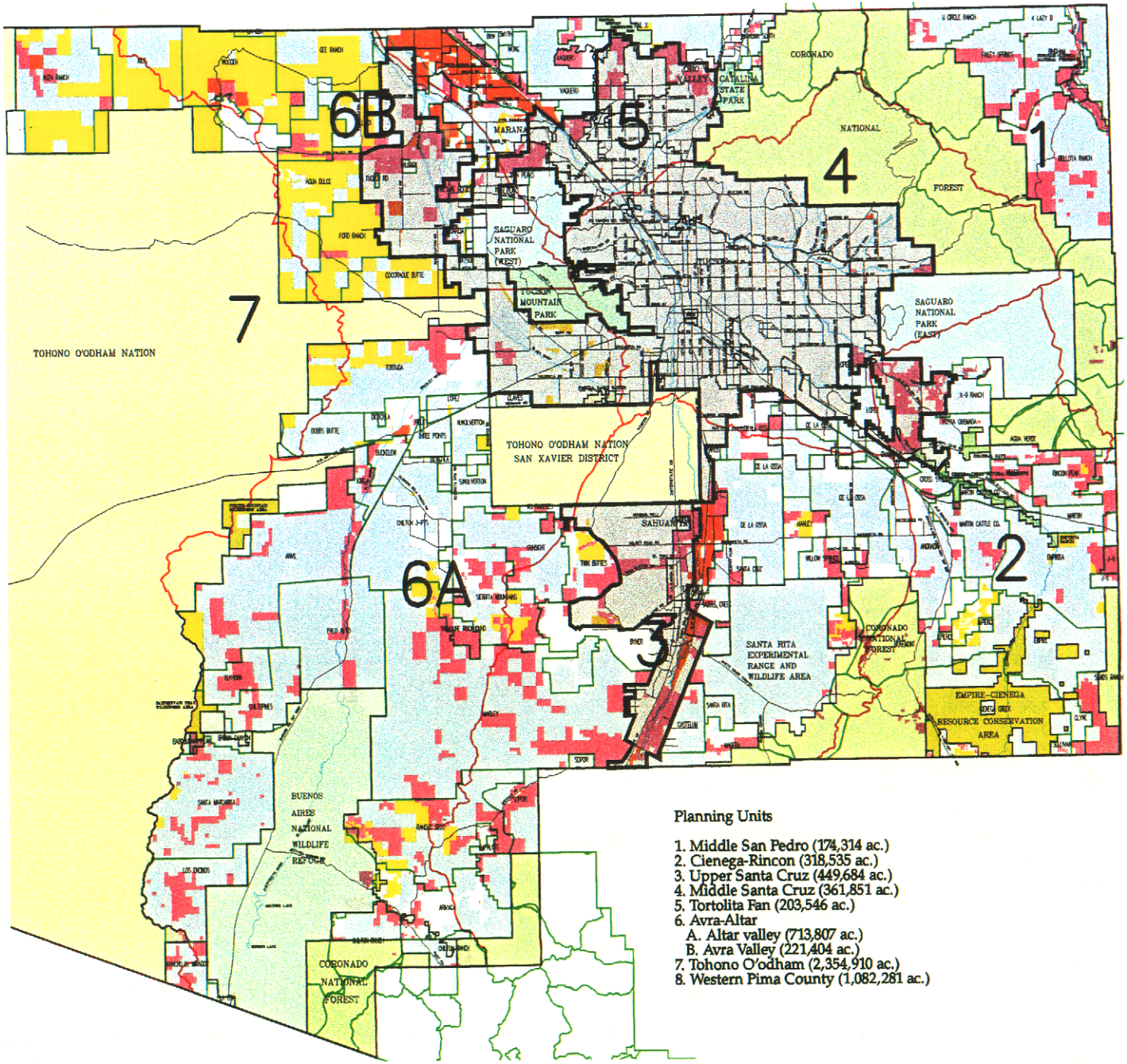
Table VII-1.1 - Alternative 1. The Tucson Metropolitan Area Defined by Grazing Leases

Subarea:	Total Area:	Metro Area:	Ranch/Natural Area:
1. San Pedro	174,314 ac	0 ac	174,314 ac
2. Empire-Cienega	318,535	17,165	301,370
3. Upper Santa Cruz	449,684	64,361	385,323
4. Middle Santa Cruz	361,851	203,831	158,020
5. Tortolita Fan	203,546	68,252	135,294
6a. Altar Valley	713,807	40,712	673,095
6b. Avra Valley	221,404	51,322	170,082
TOTAL	2,443,141 ac	445,643 ac	1,997,498 ac

In this alternative for ranch conservation for eastern Pima County, today's current grazing leases areas that comprise the estimate of approximately 1.4 million acres of natural open space remains in productive ranching use, leaving some 445,000 acres (696 square miles) available for future urban growth and expansion of the Tucson metropolitan area.

Given that the incorporated limits today of the City of Tucson, South Tucson, Oro Valley, Marana, and Sahuarita together currently comprise only 200,126 acres, or 312 square miles, there is considerable area in the greater metropolitan for expansion that is not contained in current grazing lease boundaries. This growth area of nearly 700 square miles is more than twice the size of today's urban limits.

The Urban Boundary Defined by Grazing Allotments and Ranch Lands in Pima County, 1999.

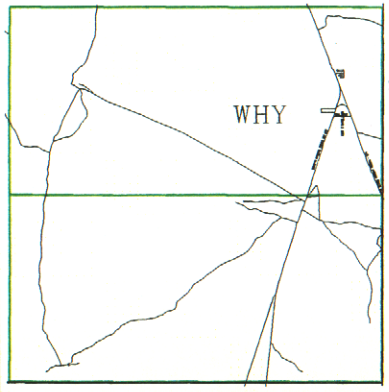


Planning Units

1. Middle San Pedro (174,314 ac.)
2. Cienega-Rincon (318,535 ac.)
3. Upper Santa Cruz (449,684 ac.)
4. Middle Santa Cruz (361,851 ac.)
5. Tortolita Fan (203,546 ac.)
6. Avra-Altar
   A. Altar valley (713,807 ac.)
   B. Avra Valley (221,404 ac.)
7. Tohono O'odham (2,354,910 ac.)
8. Western Pima County (1,082,281 ac.)

- Urban Boundary
- Major Roads And Streets
- Major Washes
- Grazing Allotments
- Sonoran Desert Conservation Planning Unit Boundaries
- Ranch Lands
- Agricultural Lands
- Bureau Of Land Management (BLM)
- State Trust Lands / Santa Rita Exp. Range
- Wildlife Refuge / Conservation Area
- Coronado National Forest
- Tucson Mountain Park / State Park
- Goldwater Gunnery Range
- Tribal Lands
- National Monument
- Cienega Creek / Colossal Cave
- Urban Boundary

Why Inset



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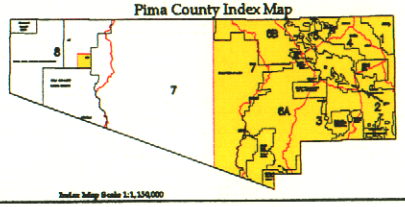
Pima County Index Map



Index Map Scale 1:1,134,000

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/pygsyowl2/sonora/cultural/gsmipined/plan_all/ents/urban_bnd99e.aml Plotted: 6/20/00

VII-2. Alternative 2 - Conserve Ranch Lands Defined by Future ASLD/BLM Land Sales

It has been discussed elsewhere and at some length that eastern Pima County has a disproportionately high amount of State Trust lands selected precisely because of their high productivity as grazing lands. With the transition of Arizona's economy from a rural, extractive base to urban, commercial enterprise, there is increased pressure on the Arizona State Land Department (ASLD) to derive maximum revenue from its lands through sale or lease for its beneficiaries rather than to continue to lease the land for grazing purposes.

It has also been noted that when combined with private land, fully 64 percent of eastern Pima County could be developed. While a completely developed eastern Pima County is probably not likely to occur because of other limitations, the conversion of State Trust grazing lands for urban development is, in fact, ongoing. With increasing land values in areas that adjoin the urban area, the Arizona State Land Department has imposed 5 year time limits on16 grazing permits called Special Land Use Permits (SLUPs) in anticipation of sale or lease of these lands for commercial or residential development. These 16 SLUPs totaling some 53,000 acres are located throughout the metropolitan area, and tend to be located in projected high commercial growth areas along major transportation corridors, within incorporated jurisdictions, or where future annexations by the City of Tucson or other jurisdictions are anticipated, all within the 25 mile radius of the Tucson urban core.

In this alternative, the area that may be considered for ranch conservation is reduced and the urban metropolitan area is expanded. When disposable BLM lands and interspersed private lands are also considered with the SLUP parcels, the area which can become developed expands to more than 88,000 acres, and much of it is in the Upper Santa Cruz Valley.

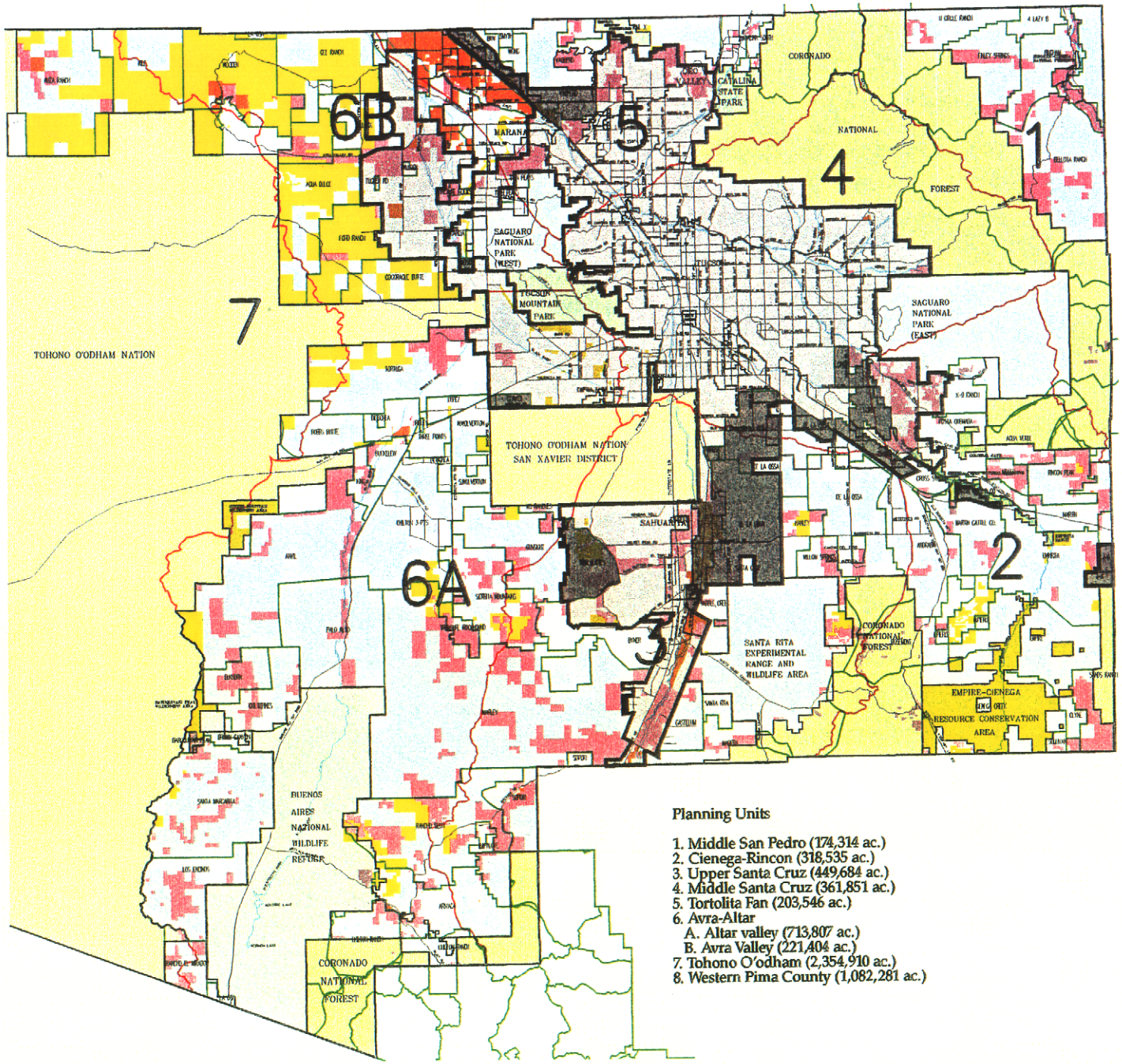
Table VII-2.1 - Alternative 2. The Tucson Metropolitan Area Defined by Future Land Sales

Subarea:	Total Area:	(Current Metro	+	Sales)	=	Future Metro.	Ranch Area:
1. San Pedro	174,314 ac	0		0 ac		0 ac	174,314 ac
2. Empire-Cienega	318,535	17,165		7,817		24,982	293,553
3. Upper Santa Cruz	449,684	64,361		49,075		113,435	336,249
4. Middle Santa Cruz	361,851	203,831		17,919		221,750	140,101
5. Tortolita Fan	203,546	68,252		11,101		79,353	124,193
6a. Altar Valley	713,807	40,712		1,981		42,693	671,114
6b. Avra Valley	221,404	51,322		645		51,967	169,437
TOTAL	2,443,141 ac	(445,643	+	88,538)	=	534,181	1,908,960 ac

By assuming all of the ASLD SLUPs, BLM land, and interspersed private lands are converted sometime in the future, this expands the urban metropolitan area to some 534,000 acres or 835 square miles, which is more than 2.5 times larger than the current area of all the incorporated jurisdictions combined.

As a further note of comparison for the potential for growth suggested by this alternative, which suggests some 835 square miles can be developed, both the City of Los Angeles and the City of Phoenix currently have identical incorporated areas of 470 square miles.

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



Planning Units

1. Middle San Pedro (174,314 ac.)
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Urban Boundary
Major Roads And Streets
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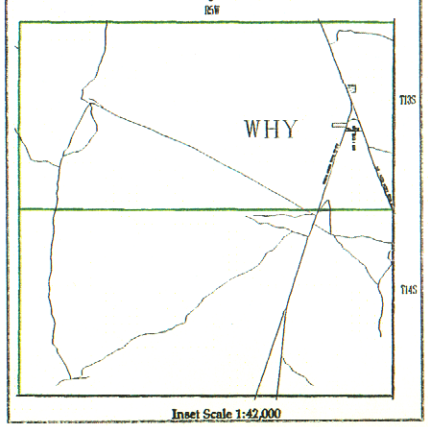
Tribal Lands
National Monument
Cienega Creek / Colossal Cave
Urban Boundary
ASLD / SLUP's

Why Inset



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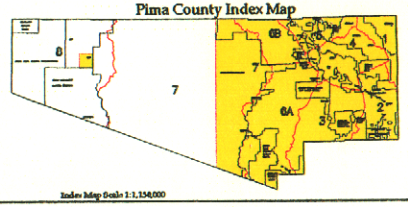
Pima County Index Map



Index Map Scale 1:1,154,000

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SEAL OF PIMA COUNTY ARIZONA

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VII-3. Means of Conservation

The above concepts have been included as two possible ways to define the limits of ranch conservation based either on today's grazing leases boundaries or those in the future should the ASLD, BLM, and others sell or lease current grazing lands for commercial purposes. These two concepts reflect very current and real trends in ranching land use and land use conversion using ranch and grazing lease boundaries as meaningful units for conservation. However, it has also been shown earlier that it is the private lands that are the most vulnerable to development pressure. Even if it were possible to define the urban edge using grazing lease boundaries, it is the private lands within these leases that would still be most likely to be converted first for development. Consequently, another way to consider preserving the rural - urban land transition is to focus attention on the 25 mile radius from the Tucson urban core. While this, too, is not an urban "boundary," this urbanizing perimeter does reflect a certain reality and a certain urgency.

Assuming it is the community's desire to maintain the integrity and connectivity of these private and public ranch lands and to conserve natural open space, then active measures will be necessary to prevent their fragmentation. These include options for land owners, as well as options for local government, that will assist community-based conservation planning. In addition, these measures must guarantee to ranchers and rural property owners that their property rights will be preserved and honored and their financial status will not be compromised as a consequence of conservation planning.

Books have been written on voluntary options that ranchers can use to preserve their private land and meet their personal, financial, and future ownership goals, and most of these options assume the rancher wants to retain ownership or at least wants to continue in ranching. Consequently, these conservation tools tend to focus on donating or selling conservation easements, limiting development, selectively developing, diversifying the ranching operation, estate planning, and tax planning, among other options. It is beyond the scope of this report to enumerate and describe all of these conservation tools; however, because it is largely rising property values that create the vulnerability for land conversion near the urban core, it is clear that some kind of acquisition program from willing sellers will be of primary utility.

Two kinds of acquisition strategies might be pursued – acquisition in fee simple and acquisition of development rights. Both have been successfully employed in southern Arizona. For example, both the Empirita Ranch and Posta Quemada Ranch are examples of properties purchased by Pima County for their flood control and riparian area values along Cienega Creek while maintaining their upland grazing leases and open space values through cooperative arrangements with local ranchers. Voter support for bond funding for open space acquisition has been amply demonstrated, and it will likely continue to be one mechanism to preserve parcels of critical importance for their open space, natural, and cultural values.

Another mechanism is acquisition of development rights, which can increase the "buying power" of local governments or land trusts with limited funding to conserve open space and agricultural lands while allowing approved uses such as grazing to continue. In Santa Cruz County, the Nature Conservancy recently concluded a highly significant conservation effort through their purchase of the San Rafael Ranch and selling a small portion of the ranch and a conservation easement to Arizona State Parks. The conservation easement is essentially a deed restriction that stipulates the ranch can never be sold for development, and it was these development rights that Arizona State Parks purchased using Arizona Heritage Fund

monies. The larger portion of the ranch, minus its development rights, was then sold to a rancher willing to operate the ranch according to the terms of the conservation easement.

It is possible that any ranch conservation and habitat conservation program adopted by Pima County could utilize both of these acquisition strategies as appropriate to ensure the long term integrity and viability of its ranch lands, natural resource and habitat values, cultural resource values, and open space. In addition to these conservation goals, certainly cost and land values will be primary considerations in order to conserve the greatest amount of land with the highest environmental and cultural values at the lowest cost. While conservation planning efforts have not yet recommended specific lands for habitat, ranch, or cultural resource conservation, it is likely that acquisition will be one of the tools employed. As suggested in a 1999 discussion paper by Mette Brogden and Rick Yarde on purchase of development rights, some of the issues to be decided for either acquisition method include:

- Funding source – establishment of a reliable and predictable funding source.
- Prioritization & eligibility of lands for conservation
  - what kinds of lands to protect
  - which areas to target
  - how to set priorities
- Whether to purchase in fee or purchase conservation easement
- Restrictions to be placed on the land
  - duration of the conservation easement
  - inclusion of"escape clause"
  - allowable uses and restrictions
  - public access
  - monitoring and enforcement of the easement
  - adaptive management reviews
- How much to pay for the land or easement
- What entity will manage the land or administer the easement program
- Payment options and how this affects total price

In addition to acquiring title or development rights from willing private land owners and ranchers, the future of ranch conservation is highly dependent on the future of State Trust grazing leases and SLUPs. Moreover, the future of a "purchase of development rights" program is also made more complicated because of the lack of certainty of tenure on State Trust grazing leases. What happens to the rancher who sells the development rights to his private land and then loses his leased grazing lands to development? Given this uncertainty, private land owners and ranchers may be highly hesitant to sell development rights to their private lands when the State Trust lands they use for the operation of the ranch can be sold for development at any time. Such is certainly likely to be the position of ranchers who own private property affected by the commercial status of some 53,000 acres of ASLD SLUPs. Without these State grazing leases, there is no ranch, no future economic viability for the rancher, and the entire effort to conserve ranch lands and natural open space and habitat is ultimately thwarted.

One way to address this inconsistency is for the ASLD to guarantee long-term grazing leases to ranchers in exchange for improved land stewardship and ecological enhancements, a concept considered in the State's proposed Growing Smarter Plus legislation that may or may not be on the November 2000 ballot. While this is a promising inclusion, it is not yet defined as a program, and there are no details of how these longer term leases would be guaranteed.

In addition to the possibility of longer term grazing leases, the proposed legislation also includes a Conservation Reserve program to protect up to 3 percent of State land and a Development Rights Retirement fund for the purchase, lease, or transfer of development rights of private lands. As noted above, the eligibility of this measure for inclusion on the ballot remains in question, and for the present time and perhaps foreseeable future, there are no mechanisms currently available for the meaningful conservation of State Trust lands, which leaves the future of ranch conservation somewhat tenuous and unresolved.

VIII. Concluding Remarks

- Ranch conservation is a key element of the Sonoran Desert Conservation Plan because of its unique and fundamental role in maintaining the integrity of natural open space and in continuing the critical stewardship provided by ranchers in managing the land.
- Pima County has 2.9 million acres classified as grazing lands and ranks third of all Arizona counties in grazing land. Eastern Pima County has 1.4 million acres.
- Most ranches are comprised of a mosaic of land ownership and include relatively small private parcels that typically encompass some of the most biologically sensitive lands.
- State Trust grazing leases, some 818,000 acres, account for more than 50 percent of all ranch lands; more than 50,000 acres are currently identified for development.
- Ranching is an important land use in every valley in Pima County. The Altar Valley, Empire-Cienega Valley, Upper Santa Cruz Valley, San Pedro Valley, and Avra Valley have the highest extent, capacity, and potential for sustainable ranching to continue.
- Urban growth in the Tucson metropolitan area consumes about 13 acres of land each day, and nearly 40 percent of this growth is unregulated.
- Ranch land fragmentation is greatest within a 25 mile radius of the Tucson urban core where land values are increasing and lands are being converted to urban uses.
- If grazing leases are used to define the current urban/rural interface, nearly 700 square miles are available for urban growth and expansion in the Tucson metropolitan area.
- Land conservation tools available to property owners and Pima County can assist in the long term conservation of private ranch lands; however, the future disposition of State Trust grazing lands leaves the potential for ranch conservation uncertain.
- Both long-term grazing leases and a purchase of development rights program for willing sellers are needed if ranch conservation is to be successful in preserving what remains of our natural and cultural landscape – our common ground.

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