



MEMORANDUM

Date: May 23, 2002

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

From: C.H. Huckelberry
County Administrator

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

Re: **Cost Model for Section 10 Endangered Species Act Compliance for All Impacts in the Unincorporated Area of Pima County**

The Sonoran Desert Conservation Plan is both a long-term and short-term plan to guide growth and development in Pima County. Certain concepts related to the environment, particularly the conservation of biological and cultural resources, have been integrated into the Comprehensive Land Use Plan of Pima County. This action occurred in December of 2001, and has been reconfirmed with readoption of the Comprehensive Land Use Plan in April 2002.

The long-term vision of the Sonoran Desert Conservation Plan is to promote a continuing quality of place that conserves our natural resources, projects our western heritage, and accommodates future population growth. Achieving this long-range vision will take decades of consistent vision and planning.

The short-term goal of the Conservation Plan is to obtain Endangered Species Act compliance for all possible impacts under the jurisdiction and control of Pima County. By far the largest impact will be losses of natural and cultural resources due to continued population growth. The only area under the exclusive control of Pima County, and hence the Board of Supervisors, is the unincorporated area of Pima County. Endangered Species Act compliance will also be the responsibility of other municipalities and jurisdictions, as well as the State Land Department. Based on the present planning process to develop a multi-species habitat conservation plan, the municipalities and State Land Department will have to mitigate for their impacts separately.

The attached cost model has been prepared to frame the issue of the estimated cost of Endangered Species Act compliance for Pima County under the present planning model. There have been widely varying claims of the cost of compliance, ranging from half a billion to one billion dollars. The results of this cost model analysis indicate that compliance with the Endangered Species Act for all impacts in the unincorporated area of Pima County, both public and private, will cost in the range of a low of \$40 million to a high of \$212 million. The actual cost will depend upon which conservation action strategy is desired by the community and eventually approved by the Board. It is also likely that the Board will wish to introduce equitable cost sharing for this compliance with the primary beneficiaries, who will be those parties who wish to develop lands lying in the existing Biological Reserve. It is quite possible that the public cost of compliance could be cut in half if equitable cost-sharing arrangements are made with the primary beneficiaries of a regional County Section 10 Permit for the unincorporated area -- land and real estate development interests.

The Honorable Chair and Members, Pima County Board of Supervisors
**Cost Model for Section 10 Endangered Species Act Compliance for All Impacts in the
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This present cost model estimate is based on very conservative assumptions which, if anything, overstate potential costs, including that:

- Growth in the unincorporated area of Pima County will be at least 100,000 persons in the next 20 years. Such exceeds, by a factor of 2, present PAG estimates that have been reduced from official forecasts due to significant municipal annexations of State Trust land.
- Fully one-half of this new growth will locate in environmentally sensitive lands in the Biological Reserve, even though only 17 percent of the existing dwelling units in the unincorporated area of Pima County actually lie in a Biological Reserve today.
- We, as governmental planners, will be unsuccessful in promoting mixed use, more compact development and, hence, our sprawling urban density of the past will continue into the future at an average of 3,000 persons per square mile.
- The Comprehensive Plan Conservation Lands System guidelines will be largely ineffective and will only apply to 25 percent of the Comprehensive Plan amendments and rezoning actions in the Biological Reserve.
- State land releases and development of State Trust lands in the Biological Reserve will account for only 15 percent of any future growth in the unincorporated area.
- The mitigation ratios negotiated with the United States Fish and Wildlife Service will remain relatively high. Even though they vary today between 4 to 1 and 1 to 1, it is assumed that the community will be unable to negotiate a mitigation ratio of less than 3 to 1.

Using these conservative assumptions, the amount of mitigation reserve that will be necessary to offset biological impacts for the next 20 years in the unincorporated area of Pima County will equal approximately 20,000 acres, or approximately the same size as Tucson Mountain Park.

Given this cost analysis model, attaining Section 10 compliance and a permit will not be financially difficult for Pima County. This is particularly true when it is considered that this cost of compliance for the public will range from \$20 million to \$110 million, depending on the mitigation alternative selected, and that, over the last 25 years, Pima County has invested approximately \$100 million in open space acquisitions on a voluntary basis, as opposed to being required to by Federal law.

CHH/jj

Attachment



Cost Model for Section 10 Endangered Species Act Permit for the Unincorporated Area of Eastern Pima County

Executive Summary

Background

This discussion paper describes the steps to be considered in establishing a cost model for the endangered species permit that will be issued to Pima County. The twenty-nine pages of text, maps and data which follow are organized around six basic questions: (1) How much population growth will unincorporated Pima County accommodate during the next twenty years?; (2) Will demand for vacant land increase in the Conservation Lands System?; (3) How much habitat in the Conservation Lands System will be impacted during the next twenty years?; (4) What factors might offset these impacts and to what extent?; (5) Approximately how much conserved land is needed to offset impacts?; and (6) What are the implementation methods and costs to conserve land needed to offset impacts?

Population Growth in Unincorporated Area

As part of discussion of future impacts, the paper presents data on population growth and the location of such in relation to the Conservation Lands System. Before recent annexations, the Pima Association of Governments had published population projections that predicted growth of 157,630 in the unincorporated area over the next 20 years. In the last 18 months, however, over 63 miles of unincorporated Pima County has been annexed by the City of Tucson, Town and Marana, and Town of Sahuarita. One result of these annexations is that the incorporated areas have increased their responsibilities for protection of endangered species habitat such as the pygmy-owl and Pima Pineapple Cactus. The annexations have also caused a downward shift in population projections for the unincorporated area: the current draft of revised population estimates and projections from Pima Association of Governments indicates an unincorporated population increase of 36,680 in the next twenty years.

The assumption adopted in the Cost Model discussion paper is that 100,000 people will be accommodated by future development in the unincorporated area during the next 20 years. This more than doubles the current Pima Association of Governments draft projections for the unincorporated area, and therefore overstates the impacts and estimates of the cost of the permit. In the next 20 years, if the population more than doubles the latest draft projections and increases by 100,000 in the unincorporated area, approximately 44,843 housing units will be constructed in unincorporated Pima County.

Not all of these units will be located in the Conservation Lands System, however. Currently there are about 22,786 units that cover 64,969 acres of the System, which means that less than 17 percent of our present housing units in the unincorporated area occurs in the highest resource areas. Viewed another way, the present impact of 64,969 acres to the Conservation Land System is only 6.8 percent of the total unprotected system. Given decades of past growth, the number of housing units constructed in areas of biological significance is relatively low, and is expected to remain low in the future, primarily due to the unavailability of urban infrastructure.

Vacant Land Demand in the Biological Reserve or Conservation Lands System

To get at the issue of whether demand would continue to be low for land in the Conservation Lands System, an analysis of vacant land was carried out and findings include:

Unincorporated Vacant Land Outside of the Conservation Lands System - Within unincorporated Eastern Pima County, there are 56,320 acres, or 88 square miles of vacant land, with relatively low resource value that is not included in the Conservation Lands System. Of this, 23,680 acres are privately owned, and 32,640 acres are owned by the State Land Department.

Vacant land within the existing sewer system service area - In the unincorporated area of Eastern Pima County, there are 26,213 acres or 41 square miles of vacant land within the sewer service area.

Unincorporated vacant land with sewer but outside the Conservation Lands System - In the unincorporated area, there are 17,138 acres of vacant land – almost 27 square miles – that have sewer system access and no biological resources worthy of inclusion in the Conservation Lands System. Developing only the non-biological reserve lands within the existing sewer service area in the unincorporated area of the County could accommodate anticipated unincorporated growth for the next 20 years.

Impacts to the Conservation Land System

If the population increases by 100,000, 44,843 new housing units would be required. At current densities of 3,000 persons per square mile, the footprint of this growth will be 33.3 square miles. For purposes of this analysis, it is assumed that half of the impacts will be within the Conservation Lands System, even though: 17 percent of existing housing units in the unincorporated area are presently within the Conservation Lands System, and 88 square miles of vacant land outside of the Conservation Lands System exists in unincorporated Pima County. Even with a high population projection, a relatively sprawling density assumption, and an assumption that half of the impact will occur in the Conservation Lands System, a projected impact of 10,667 acres over the next 20 years – or 16.7 square miles – does not present a major mitigation dilemma.

Measures that Offset Impacts

This section describes factors which could offset the total impact of urbanization in the unincorporated area, and thus reduce the cost of the Section 10 permit.

The Conservation Lands System provides guidance to avoid or minimize impacts of future land use change proposals to amend either the Comprehensive Plan or rezoned property in the Biological Reserve. For purposes of this analysis it will be conservatively estimated that the Conservation Lands System development policy is only effective 25 percent of the time. If the policy is effective 25 percent of the time, then the total area of urban disturbance requiring mitigation for species compliance can be reduced from 10,667 acres (16.7 square miles) to 8,000 acres (12.5 square miles).

State Land Conversion – Another factor which could reduce the overall burden on Pima County to mitigate the impacts of future growth is the fact that over the course of two decades, some of this impact may occur on State Land that is released for urbanization. State Trust lands are not part of the County Section 10 process and hence will be required to mitigate for habitat losses separately. If State Land accommodates 15 percent of new impacts, then the total area of urban disturbance requiring mitigation for species compliance by Pima County might be reduced from 8,000 acres to 6,800 acres.

Mitigating Impacts and Mitigation Ratios – We could assume that the mitigation ratio for impacts to habitat will be at the highest ratio we have seen administered, 4 to 1. The recent annexations by Marana, the City of Tucson, and Sahuarita have reduced the endangered species dilemmas in the unincorporated area for the pygmy-owl and Pima Pineapple Cactus compliance matters, therefore we could also contemplate a 3 to 1 or even 2 to 1 mitigation ratio for purposes of discussion.

Approximate Amount of Conserved Land Needed to Offset Impacts

If the previously discussed offsets are effective, and the total area of urban disturbance requiring mitigation for species compliance by Pima County is on the order of 6,800 acres, then a 3 to 1 ratio would require 20,400 acres of mitigation. Translating this to square miles, mitigation would be under 32 square miles, about the size of Tucson Mountain Park.

Implementation Methods and Costs

To show the relative cost of implementing the Section 10 conservation program, four different alternatives are described. A combination of these might be recommended by the Steering Committee. Further the alternative must be biologically viable for species conservation and therefore must be acceptable to the United States Fish and Wildlife Service.

1. Ranch Conservation – Ranch lands offer perhaps the greatest opportunity to conserve large blocks of land with high resource value. The cost of acquiring ranch lands can be calculated based on an estimated per acre cost. For purposes of discussion a cost of \$2000 per acre will be used. Assuming a reserve of 20,400 acres is required for the Section 10 permit and that ranch land which would offset impacts to the satisfaction of the Service is available, the cost of acquisition would be on the order of \$40.8 million.

2. Mountain Park Expansion and Ranch Conservation – The cost of achieving a reserve increases as the land to be conserved is closer to urbanizing areas. Mountain Parks are sometimes located closer to urban areas than ranch lands. The cost of open space in these areas is increasing. For land surrounding Catalina State Park, Colossal Cave, and Tortolita Mountain Park, a cost per acre of \$1,700 to \$8,000 is reported. For purposes of discussion, a figure of \$5,000 per acre will be used. For land surrounding Tucson Mountain Park, a cost per acre of \$7,500 to \$20,000 per acre is reported. For purposes of discussion, a figure of \$12,000 per acre will be used. Assuming that 5,000 acres of land is added to Tucson Mountain Park, and the remaining reserve acreage is acquired to expand protected areas at the cost of \$5,000 per acre, and assuming that land which would offset impacts to the satisfaction of the Service is available, the cost of acquisition in today's dollars would be on the order of \$137 million.

3. High Conservation Value Land on the Northwest Side – The cost of achieving a reserve increases significantly when the land to be conserved is actually in an urbanizing area. This subsection discusses the potential costs of obtaining a Section 10 permit through the conservation of lands that would create a reserve in northwest Tucson. Maps show unincorporated vacant land within an area known as Recovery Area 3 for the pygmy-owl and a subset of that area, known as the High Conservation Value Area. This land is highly fragmented and expensive. A review of the appraised value of open space surrounding these areas in light of market factors provides guidance in estimating the cost per acre for open space acquisition. A budget of at least \$20,000 per acre should be used at this time. There are approximately 5,000 acres of vacant land in the unincorporated area of Recovery Area 3, and about 2,363 of this is in the High Conservation Value Area. Assuming all 5,000 acres could be acquired, a budget of at least \$100 million would be needed. This reserve would be inadequate for multi-species protection. While it would likely exceed the land needed by Pima County to offset impacts to pygmy-owl habitat, pygmy-owl protection at the regional level would require strategies in other recovery areas too. For purposes of discussion, concentrating conservation in the Northwest, Tortolita and Tucson Mountain Park could cost as much as \$212 million.

4. Riparian Protection and Restoration

Riparian areas offer the greatest conservation opportunity per acre, given their importance to the majority of priority vulnerable species. Assuming a reserve of 20,400 acres in size, the cost of acquiring riparian areas can be calculated based on an estimated per acre cost. For purposes of discussion a figure of \$2,000 per acre will be used for rural areas, which often coincide with ranch lands, and a figure of \$3,000 per acre will be used for riparian lands closer urbanization. A 20,400 acre reserve comprised of 50 percent rural and ranch riparian lands, and 50 percent riparian lands closer to urbanization would cost \$51 million.

Conclusion

Ranch and riparian conservation offer the greatest scope at the least expense. Mountain Park expansion is more expensive. The conservation of land on the northwest side is costly and ultimately may not be sufficient to approach regional multi-species goals. This model will allow the Steering Committee and interested members of the public to weigh the trade offs of recommendations that they may forward to the Board for consideration. The general range of cost for the Section 10 permit, if the assumptions above are adopted, would be between \$40 million and \$212 million.



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for the Unincorporated Area of Eastern Pima County

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**Cost Model for Section 10 Endangered Species Act Permit
for the Unincorporated Area of Eastern Pima County**

I. Introduction

This paper describes the steps to be considered in establishing a cost model for the endangered species permit that will be issued to Pima County. The cost of a Section 10 permit that will ensure compliance with the Endangered Species Act in unincorporated Pima County has been widely debated and the topic has become unnecessarily complicated.

Early reports put the cost of completing the Sonoran Desert Conservation Plan in excess of \$500 million. The Sonoran Desert Conservation Plan is an overall vision policy of Pima County to conserve both natural and cultural resources. Elements of the Plan have been a policy goal of Pima County since 1929. Since 1974, over \$125 million has been spent on acquiring open space for mountain parks, conserving ranches to prevent land fragmentation, and preserving and restoring valuable riparian areas. It is likely that the community will continue to support expenditures for quality of life purposes as it has in the past.

The Section 10 permit itself, however is a subset of the larger Sonoran Desert Conservation Plan and is not going to be the sort of extraordinary expense for Pima County Government that has been predicted by detractors of Pima County's conservation planning efforts.

With the listing of a number of threatened and endangered species in Pima County, federal Endangered Species Act compliance has become more difficult. This difficulty was highlighted with the listing of the Cactus Ferruginous Pygmy-Owl. Developing a multi-species habitat conservation plan in association with the Sonoran Desert Conservation Plan was determined to be the best response to species listing. An incidental take permit for regional scale impacts through a Section 10 permit has been accepted as the most economical and regionally viable method of Endangered Species Act compliance in Pima County.

Pima County has entered into a number of cooperative agreements with federal agencies to develop the Sonoran Desert Conservation Plan and its corresponding Endangered Species Act compliance. However, other municipal jurisdictions and the State Land Department are not now participating. Endangered Species Act compliance from the perspective of Pima County covers only the unincorporated area of Pima County. Therefore, in developing a conceptual compliance cost model for the Sonoran Desert Conservation Plan, the only impacts to be considered in this paper are those within unincorporated Pima County, and then only private impacts and those impacts of the County in the unincorporated area.

The purpose of this paper is to describe the range of future impacts and costs in order to suggest that a common sense approach should be taken to assess cost issues, and the discussion about how much should be spent can then be founded on facts and experience, so that the debate is constructive.

II. Estimating Future Endangered Species Act Impacts

A. Population Growth

The scope of the compliance area is only the unincorporated area of Pima County. For purposes of discussion, impacts to be calculated are those of Pima County government and private impacts associated with County government permits and facilities within the Conservation Lands System of the unincorporated area. Impacts are generally found in the conversion of lands of the Sonoran Desert to urban uses. This conversion is driven by population growth in the unincorporated area.

To obtain an estimate of the habitat losses over the next 20 years, then, a reasonable first step in calculating impacts is to estimate population growth. This analysis assumes the jurisdictional boundaries of municipalities will remain relatively constant over the next 20 years. This assumption will result in an overstatement of the cost of the plan, since future annexations of biologically sensitive areas, to the extent such occur, would reduce the cost of compliance for unincorporated Pima County.

B. Effect of Recent Annexations on Population Projections

Population projections for Pima County have more often than not overestimated the population of Pima County.¹

Before recent annexations, the Pima Association of Governments had published population projections that predicted growth of 157,630 in the unincorporated area over the next 20 years. (Appendix 1)

The table on the following page shows the actual population growth increment by decade for the entire County population and for the unincorporated area since 1950, along with Pima Association of Governments projections through 2020, though the projected figures are being adjusted downward due to recent annexations, as discussed below.

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Comparison: All Pima County

Year	Actual	1962 Projections	1980 Projections	1984 Projections	1992 PAG Projections	1997 PAG Projections
1980	531,440	680,000				
1990	666,880	980,000	655,545	723,425		
2000	843,746	1,500,000	818,614	942,149	836,274	854,329

Actual and Projected Future Population Growth Increment in Pima County

YEAR	TOTAL	CHANGE	UNINCORPORATED	CHANGE
1950	141,216		93,398	
1960	265,660	124,444	45,764	(- 47,634)
1970	351,667	86,007	80,773	35,009
1980	531,445	179,778	191,216	110,443
1990	666,880	135,435	247,540	56,324
2000	843,756	176,876	305,059	57,519
2010	1,031,627	187,871	388,083	83,024 (projected)
2020	1,206,246	174,619	462,689	74,606 (projected)

A number of municipal annexations of vacant State Trust land will significantly reduce future population growth in the unincorporated area.

- The City of Tucson annexed 25.7 square miles of State Trust land on May 9, 2001.
- On November 12, 2000, the Town of Sahuarita annexed 2.3 square miles.
- The Town of Marana annexed 35.2 square miles on March 5, 2002.

These annexations of vast blocks of State Trust land, available for urban development, will reduce regional population growth in the unincorporated area.

Based on recent annexations, the current working draft of revised population estimates and projections from the Pima Association of Governments indicates that the unincorporated area will see a population increase of 36,680 in the next twenty years, with more than half of this impact (just over 19,000) arriving in the next decade. (Appendix 2)

While these estimates will likely be revised, the new projections will signal a significant reduction in future population growth for unincorporated Pima County. Even if the total doubles to 80,000, this number is approximately half of the pre-annexation projections.

For purposes of this analysis a population growth increment of 100,000 will be used. This more than doubles the current Pima Association of Governments draft projections for the unincorporated area, and therefore overstates the impacts and estimates of the cost of the permit.

If less population growth occurs, as projected by the Pima Association of Governments, or if there are additional annexations, then the cost of compliance in the unincorporated area will be less than estimated by this analysis.

C. Housing Units in the Unincorporated Area

The number of housing units in the unincorporated area as a percent of all units in the County will decline as population growth is accommodated in the incorporated areas. In the next 20 years, if the population more than doubles the latest draft projections and increases by 100,000 in the unincorporated area, approximately 44,843 housing units will be constructed in unincorporated Pima County to accommodate growth based on an average household occupancy of 2.23 per unit.² In 2000 there were 134,174 homes in unincorporated Pima County; therefore 44,843 would represent a 33 percent increase.

D. Allocation of Impacts to and within the Biological Reserve

Fundamental to determining the cost of Endangered Species Act compliance is the location of development in relation to valuable biological resources necessary for species survival. Recent scientific studies and analyses of the Sonoran Desert Conservation Plan have mapped out areas of biological significance in Pima County that contribute to biodiversity and species survival. This section discusses current and future impacts to and within these areas. The first subsection views impacts in terms of past and projected housing units. The second subsection discusses the availability of vacant land. The third subsection discusses vacant land that is within the sewer system service area. And the fourth section discusses both the rate of urbanization and density of that urbanization.

1. Housing Units in the Biological Reserve – One way of viewing impacts is to focus on the impact of housing units within the reserve. Map 1 reflects the footprint of housing types across the Conservation Lands System. In aggregate, these residences are found on 22,786 parcels that cover 64,969 acres. Because only 1 percent of the residences are multi-family or townhouses, the number of housing units is approximately that of the number of improved parcels: under 23,000. Therefore less than 17 percent occurs in the highest resource areas.

(a) Total Residential Units in the Conservation Lands System

RESIDENTIAL UNITS CURRENTLY IN THE CONSERVATION LANDS SYSTEM AREAS

RESIDENTIAL TYPE	PARCELS	% OF TOTAL PARCELS	ACRES	% OF TOTAL ACRES
Single Family	15,486	68 %	42,967	66 %
Multi Family	45	0.2 %	139	0.2 %
Mobile Home	7,053	31 %	21,838	34 %
Town Home	202	0.8 %	25	0 %
TOTALS	22,786	100 %	64,969	100 %

² The number of housing units necessary to support population growth depends on average occupancy. Household occupancy has been steadily declining from 3.3 persons per household in 1960 to 2.47 in 2000. If occupancy does not continue to decline, the analysis based on 2.23 per unit will overstate impacts to habitat and therefore the cost of the permit.

- The Conservation Lands System in the unincorporated area of Eastern Pima County covers 1,918,378 acres, with approximately 956,800 acres, or half the land, in protected status.
- Therefore, the current impact of 64,969 acres to the Conservation Land System is only 6.8 percent of the total unprotected system. (Map 1)

(b) Total Residential Units in the Biological Core Areas of the Conservation Lands System

RESIDENTIAL UNITS IN THE BIOLOGICAL CORE OF THE CONSERVATION LANDS SYSTEM

RESIDENTIAL TYPE	PARCELS	% OF TOTAL PARCELS	ACRES	% OF TOTAL ACRES
Single Family	1,850	64 %	11,842	67 %
Multi Family	11	0 %	38	0 %
Mobile Home	1,044	36 %	5,922	33 %
Town Home	11	0 %	2	0 %
TOTALS	2,916	100 %	17,804	100 %

- The Biological Core areas within the Conservation Lands System in the unincorporated area of Eastern Pima County cover 778,391 acres.
- Therefore, the current impact of 17,804 acres to the biological core areas is only 2.2 percent of the total core area of the Conservation Lands System. (Map 1)

(c) Total Residential Units in the Non- Biological Core Areas of the Conservation Lands System

RESIDENTIAL UNITS IN NON-BIOLOGICAL CORE OF THE CONSERVATION LANDS SYSTEM

RESIDENTIAL TYPE	PARCELS	% OF TOTAL PARCELS	ACRES	% OF TOTAL ACRES
Single Family	13,636	69 %	31,125	66 %
Multi Family	34	0 %	101	0 %
Mobile Home	6,009	30%	15,916	34 %
Town Home	191	1%	23	0 %
TOTALS	19,870	100 %	47,165	100 %

- The recovery, riparian, multiple use and other non-biological core areas within the Conservation Lands System in the unincorporated area of Eastern Pima County cover 1,139,987 acres.
- Therefore, the current impact of 47,165 to the non-biological core areas is only 4 percent of the total non-biological core area of the Conservation Lands System. (Map 1)

(d) Conclusion -- Residential development currently impacts 3.4 percent of the total Conservation Lands System, which translates to 6.8 percent of the unprotected areas of the System. Given decades of past growth, the number of housing units constructed in areas of biological significance is relatively low, and is expected to remain low in the future, primarily due to the unavailability of urban infrastructure.

2. Vacant Land – As a baseline it is important to understand the ownership, availability and location of vacant land.

Vacant land is defined strictly to mean land with no site or building improvement of any kind. Therefore, these figures understate the availability of developable land.

Nevertheless, current vacant land greatly exceeds the footprint of the current built environment for single family homes.

(a) Vacant state and private land in Unincorporated Eastern Pima County – There are 861,547 acres, or 1,346 square miles of vacant land owned by the State or private owners in the unincorporated area of Eastern Pima County.

- The State Land Department owns 730,144 acres of vacant land in Eastern Pima County.
- Another 131,403 acres of vacant land exists in private ownership.

Vacant State and Private Land In Eastern Pima County

Eastern Pima County	Acres of Vacant Land	Percent
State Vacant Land	730,144 acres	85 %
Private Vacant Land	131,403 acres	15 %
Total	861,547 acres	100 %

(b) Unincorporated Vacant State and Private Land In Eastern Pima County, that is Not Within the Conservation Lands System – Within unincorporated Eastern Pima County, there are over 14,239 parcels which combine to create 56,320 acres, or 88 square miles of vacant land, with relatively low resource value and so it is not included in the Conservation Land System.³ Of this, 23,680 acres are privately owned, and 32,640 acres are owned by the State Land Department. (Map 2)

³ In Eastern Pima County a total of 351 square miles of unincorporated land is outside the Conservation Lands System. More than half of this land is vacant. (Map 2)

Unincorporated Vacant State and Private Land In Eastern Pima County, Not Within the CLS

Unincorporated Eastern Pima County	Acres of Vacant Land	Percent
State Vacant Land	32,640 acres	58 %
Private Vacant Land	23,680 acres	42 %
Total	56,320 acres	100 %

3. Vacant Land and the Current Sewer System Service Area - In assessing development impacts in the near term it is useful to understand (a) the amount of vacant land within the existing infrastructure boundaries of the sewer system service area, (b) the location of existing infrastructure in relation to vacant land that is not in the biological reserve, and (c) the amount of vacant land that is within both the sewer service area and the biological reserve.

(a) Vacant land within the existing infrastructure boundaries of the sewer system service area - Development is most advantageous from a tax base perspective when it occurs within or near existing infrastructure. The sewer system service area provides an approximation of regional infrastructure, though it understates the actual presence of vacant land because the current map includes the line but not the full service area of some development that is in process. The following baseline understanding can be gained from this data:

- In the unincorporated area of Eastern Pima County, there are 26,213 acres or 41 square miles of vacant land within the sewer service area: 88.5 percent is private and 11.5 percent is owned by State Land. (Map 3)

Vacant State and Private Land within the Sewer Service Area

Eastern Pima County	Acres of Vacant Land	Percent
State Vacant Land - Unincorporated	3,013 acres	11.5 %
Private Vacant Land – Unincorporated	23,200 acres	88.5 %
Total	26,213 acres	100 %

(b) Vacant land that is within the sewer system service area but not in the biological reserve – Vacant land that is not in the Conservation Lands System and that has some degree of infrastructure access, such as sewer system service, is more suitable for development than land that is distant from infrastructure. In Eastern Pima County, there are 31,313 acres – nearly 50 square miles – of such land: 45 percent of this is in the incorporated areas, while 55 percent of this land is in the unincorporated areas.

- Unincorporated vacant land with sewer but no biological resources - In the unincorporated areas, there are 17,138 acres of vacant land – almost 27 square miles – that have sewer system access and no biological resources worthy of inclusion in the Conservation Lands System. Of this amount, 89 percent (15,338 acres) is in private ownership and 11 percent (1,800 acres) is State Land. (Map 4)

Vacant State and Private Land within the Sewer Service Area and outside the CLS

Eastern Pima County	Acres of Vacant Land	Percent
State Vacant Land - Unincorporated	1,800 acres	10.5 %
Private Vacant Land - Unincorporated	15,338 acres	89.5 %
Total	17,138 acres	100 %

(c) Land with biological constraints: vacant land that is within both the sewer system service area and the biological reserve – Vacant land that has biological resources and has some degree of infrastructure access, such as sewer system service, is less suitable for development than land that has infrastructure but low natural resource value. To the extent such land is impacted, it is foreseeable that mitigation will be needed to offset the losses to the reserve.

In Eastern Pima County, there are 16,139 acres – about 25 square miles – of such land: 44 percent of this is in the incorporated areas, while 56 percent of this land is in the unincorporated areas.

- Unincorporated vacant land with sewer and biological resources - In the unincorporated areas, there are 9,074 acres of vacant land – about 14 square miles – that have sewer system access but also have biological resources worthy of inclusion in the Conservation Lands System. Of this amount, 87 percent (7,861 acres) is in private ownership and 13 percent (1,213 acres) is owned by State Land.

Vacant State and Private Land within the Sewer Service Area and within the CLS

Eastern Pima County	Acres of Vacant Land	Percent
State Vacant Land - Unincorporated	1,213 acres	13 %
Private Vacant Land - Unincorporated	7,861 acres	87 %
Total	9,074 acres	100 %

4. Rate of Urbanization and Density – A traditional way of assessing current and future impacts to biological resources is to project the amount of surface area of biologic resource loss based on disturbance from urban growth and population expansion. Assuming that the unincorporated Pima County population increases by 100,000 over the next twenty years and 44,843 new housing units are required, land consumption can be calculated in light of estimated density.

Information has been gathered over time which describes the average persons per square mile for urban development in the unincorporated area. Pima County urban density varies from as low as 3,000 persons per square mile, to as much as nearly 6,000 persons per square mile. The average urban density peaked in Pima County in 1950 at approximately 5,000 persons per square mile, inclusive of supporting commercial and job centers.

Given past market trends, it is not anticipated that average urban density will significantly increase over what it has been in the recent past, which on the periphery of the general Tucson metropolitan region, will be in the range of 3,000 per square mile.

Therefore, by this analysis, approximately 33.3 square miles of land, or 21,333 acres, will be converted to urban uses within the unincorporated area over the next 20 years.

The next question to answer is, of these 33.3 square miles of urbanizing land, how much is likely to be located in the presently defined Conservation Lands System? As described above, the unincorporated area of Eastern Pima County that is outside of the existing Biological Reserve is vast: 351 square miles. There are approximately 88 square miles, or 56,320 acres of relatively non-biologically important vacant land in unincorporated Eastern Pima County. Much of this unincorporated vacant land abuts existing infrastructure or an incorporated area which is anticipated to be a growth area. At 3,000 persons per square mile, approximately 2.5 times more than the anticipated future unincorporated population growth in the next 20 years can be accommodated outside of a Biological Reserve.

In fact, development has not occurred to a great extent in the Conservation Lands System: only 6.8 percent of the total unprotected unincorporated area has been impacted by residential units. However, one assumption might be that in the future approximately half of the 33.3 square mile impact were to occur within the Conservation Lands System. This would only be 10,667 acres, or less than 1 percent of the Conservation Lands System in Eastern Pima County.

E. Summary of Impacts Discussion

This section summarizes the vacant land and related discussion on future impacts presented above.

- The Pima Association of Governments currently projects that the population of unincorporated Pima County will increase by 36,680 in the next two decades. For purposes of this analysis, an assumption of 100,000 is made, which more than doubles the current draft forecasts given recent annexations.
- If the population increases by 100,000, 44,843 new housing units would be required. At current densities of 3,000 persons per square miles, the footprint of this growth will be 33.3 square miles. For purposes of this analysis, it is assumed that half of the impacts will be within the Conservation Lands System, even though:

83 percent of existing housing units in the unincorporated area are not within the Conservation Lands System, and

88 square miles of vacant land outside of the Conservation Lands System exists in unincorporated Pima County.

- Even with a high population projection, a relatively sprawling density assumption, and an assumption that half of the impact will occur in the Conservation Lands System, a projected impact of 10,667 acres over the next 20 years – or 16.7 square miles – does not present a major mitigation dilemma for the unincorporated area.
- If the PAG projections are accurate, then this impact might be reduced in half. If the mitigation ratio is not the highest currently administered the acreage to be conserved would be reduced. The historical precedent of not developing in the Conservation Lands System also indicates that impacts might not be as high as this model contemplates.
- The next section discusses factors that could offset the impacts and reduce the County's obligation to mitigate under Section 10.

III. Offsetting Impacts

The last section described a way to analyze impacts and the potential location of such impacts within biologically sensitive areas. This section describes several factors which might offset the total impact of urbanization in the unincorporated area, and thus reduce the size and cost of the Section 10 permit.

A. Reducing Impacts Based on Conservation Lands System Guidance

The state law that defines the elements of the County's Comprehensive Plan calls for analysis, policies and strategies to address anticipated effects of growth on natural resources. Consistent with Arizona Revised Statutes Section 11-821(D)(3), the Pima County Comprehensive Plan has been adopted and contains an Environmental Planning Element defined as the Conservation Lands System. This Conservation Lands System provides guidance to future land use change proposals to amend either the Comprehensive Plan or rezoned property in the Biological Reserve, where biological resources of Pima County are evaluated based on impacts from growth in the County.

The Conservation Lands System provides guidance to avoid and / or minimize impacts to biologic systems. This means that lands can be put to new uses and when they are utilized consistent with the guidelines, it is possible that little if any mitigation is needed in order to conform with the biological goal of the Sonoran Desert Conservation Plan.

The policy as adopted is a guideline and is to be used by the Board when evaluating future land use change proposals in areas of biological sensitivity.

While the use of these guidelines will minimize future mitigation requirements to achieve compliance, they will not eliminate these requirements since in many cases the guidelines will not be met, or compliance will be difficult, if not impossible, due to factors such as small parcel size or siting and configuration constraints.

Nevertheless, the guidelines are in effect and they will be effective to some extent in reducing future mitigation requirements. Therefore, for purposes of this discussion, we could assume that implementation of the guidelines could reduce future mitigation under the Endangered Species Act.

In the analysis related to impacts, all assumptions overstated the predictions about the magnitude of the impacts. Consistent with that approach, assumptions about the potential to offset impacts will be understated.

For purposes of this analysis it will be conservatively estimated that the Conservation Lands System development policy is only effective 25 percent of the time.

If the policy is effective 25 percent of the time, then the total area of urban disturbance requiring mitigation for species compliance can be reduced from 10,667 acres (16.7 square miles) to 8,000 acres (12.5 square miles).

B. Reducing Impacts Due to State Land Pursuing Separate Federal Compliance

Another factor which could reduce the overall burden on Pima County to mitigate the impacts of future growth is the fact that over the course of two decades, some of this impact may occur on State Land that is released for urbanization.

The analysis so far has assumed that the impacts will occur on vacant land that is privately held in the unincorporated area. State Land has been released for urban purposes however and mitigation requirements have been met, for example, in the case of construction of a State prison on lands containing Pima Pineapple Cactus. The overall project area of 1,920 acres had 586 acres of impact. As part of a Section 7 consultation, 586 acres of habitat loss were mitigated at a 1 to 1 ratio.

It is foreseeable that other State Trust Lands in the vicinity of urbanizing lands in will be released for urban purposes as well. Maps 6 and 7 reflect the proximity of State Trust Lands to the proposed Rocking K development, and around the Town of Sahuarita.

High in biological resources, these areas are likely to pick up some of the population growth and require mitigation by State Land or the purchaser.

Again, in the analysis related to impacts, assumptions overstated the predictions about the magnitude of the impacts. Assumptions about the potential to offset impacts will be understated. Accordingly, we could assume that the State Lands will accommodate only 15 percent of future population growth in the unincorporated area.

If State Land accommodates 15 percent of new impacts, then the total area of urban disturbance requiring mitigation for species compliance by Pima County might be reduced from 8,000 acres to 6,800 acres.

C. Mitigating Impacts and Mitigation Ratios

Federal agencies as part of consultations generally seek to avoid impacts to protected species and when this is not possible, the mechanisms of minimizing and mitigating losses come into play. Avoidance of impacts is most achievable when there is a large landscape available for making decisions about siting and configuration of projects in accordance with species protection. With smaller parcels, avoiding impacts or even on-site mitigation becomes more difficult. Off site mitigation then becomes the mechanism for conservation. In the various consultations for endangered species, we have seen mitigation ratios ranging from 4 to 1 for pygmy-owl conservation, to 1 to 1 and 2 to 1, for Pima Pineapple Cactus conservation. This means that at a 4 to 1 ratio, the loss of an acre of habitat is offset with the conservation of 4 acres. Under a 1 to 1 ratio, an impact to one acre is replaced by one acre of conserved habitat for the species. At times, the quality or location of the habitat alters a mitigation ratio.

We could assume that the mitigation ratio for impacts to habitat will be at the highest ratio we have seen administered, 4 to 1. The recent annexations by Marana, the City of Tucson, and Sahuarita have reduced the endangered species dilemmas in the unincorporated area for pygmy-owl and Pima Pineapple Cactus compliance matters, therefore we could also contemplate a 3 to 1 or even 2 to 1 mitigation ratio for purposes of discussion.

If the previously discussed offsets are effective, and the total area of urban disturbance requiring mitigation for species compliance by Pima County is on the order of 6,800 acres, then a 3 to 1 ratio would require 20,400 acres of mitigation. Translating this to square miles, mitigation would be under 32 square miles, or about the size of the present Tucson Mountain Park.

IV. Implementation Scenarios

A. Multiple Elements with Mitigation Potential

The Sonoran Desert Conservation Plan has been crafted so as to be a multi-purpose effort directed toward overall conservation. The Ranch Conservation, Mountain Park and Riparian Protection and Restoration Elements all directly relate to habitat conservation and thus could contribute to compliance with the Endangered Species Act.

Pima County has a long history of involvement in these specific elements, with Mountain Park protection starting in 1929, Riparian Protection and Restoration beginning in 1984, and Ranch Conservation beginning in 1987. It is likely in these three elements of the Sonoran Desert Conservation Plan that Pima County has acquired and conserved approximately 68,518 acres, or 107 square miles in total. County mountain parks have been acquired or expanded in the approximate amount of 27,124 acres, riparian preservation and restoration of approximately 4,000 acres has occurred in addition to approximately 15 miles of river park, and ranch conservation has led to the conservation of 37,394 acres ranch lands through fee land and continuing grazing leases, with another 120,000 acres of conservation achieved in partnership with the Bureau of Land Management.

In assembling a reserve or the mitigation bank areas that will offset impacts in unincorporated Pima County, it is likely that these three Elements will provide reasonable strategies and opportunities to meet Pima County's compliance obligations under the Section 10 permit of the Endangered Species Act.

In recommending a strategy, the opportunity exists for members of the community and the Steering Committee to balance tradeoffs such as the fact that land away from urbanizing areas in the biological core of the Conservation Lands System is many times less expensive than land which is closer to the urbanizing area.

Further, conserving existing riparian areas through acquisition will be much less expensive than restoring already degraded riparian areas. Further, ranch conservation costs can be mitigated through the purchase of development rights or conservation easements, as opposed to fee simple acquisition of the ranch.

In addition, it is possible that through large tract purchases of State Trust land, economies of scale could be achieved if the policy goals of Pima County and the State Land Department were aligned, which they are not today.

Finally, Pima County has made a number of conservation commitments since the planning process began and discussions dating back to 1998 with the United States Fish and Wildlife Service the indicate that some of these efforts will be viable as contributions to the reserve or to mitigation banks as we enter into Section 10 negotiations with the Service. To some extent recent and pending actions in the areas of Mountain Park, Ranch and Riparian protection will offset impacts and contribute to the resolution of endangered species issues.

Given the variety and location of these projects, acquisitions, and protection measures it is likely that Pima County will be in a position to substantially offset future impacts to endangered and priority vulnerable species with recent and pending initiatives.

1. Ranch Conservation

Ranch lands offer perhaps the greatest opportunity to conserve large blocks of inexpensive land that has high resource value. The cost of acquiring ranch lands can be calculated based on an estimated per acre cost. For purposes of discussion a figure of \$2000 per acre will be used.

Assuming a reserve of 20,400 acres is required for the Section 10 permit and that ranch land which would offset impacts to the satisfaction of the Service is available, the cost of acquisition in today's dollars would be on the order of \$40.8 million.

A higher or lower per acre cost can be substituted for purposes of discussion. This baseline provides a useful comparison, however, for weighing the costs and benefits of other methods of achieving a reserve.

2. Mountain Park Expansion and Ranch Conservation

The cost of achieving a reserve increases as the land to be conserved is closer to urbanizing areas. Mountain Parks are sometimes located closer to urban areas than ranch lands. This subsection discusses the potential costs of obtaining a Section 10 permit through the conservation of lands that would expand existing Mountain Parks. Existing parks and reserves include:

- Canoa Ranch
- Catalina State Park
- Cienega Creek Preserve
- Colossal Cave Park
- Tortolita Mountain Park
- Tucson Mountain Park

A review by the Real Property Division of the appraised value of open space surrounding these areas in light of market factors provides guidance in estimating the cost per acre for open space acquisition.

For land surrounding Catalina State Park, Colossal Cave, and Tortolita Mountain Park, a cost per acre of \$1,700 to \$8,000 is reasonable. For purposes of discussion, a figure of \$5,000 per acre will be used.

For land surrounding Tucson Mountain Park, a cost per acre of \$7,500 to \$20,000 per acre is reasonable. The prevailing figure for land zoned SR has been around \$10,000 per acre. For purposes of discussion, a figure of \$12,000 per acre will be used.

Assuming that 5,000 acres of land is added to Tucson Mountain Park, and the remaining reserve acreage is acquired to expand protected areas at the cost of \$5,000 per acre, and assuming that land which would offset impacts to the satisfaction of the Service is available, the cost of acquisition in today's dollars would be on the order of \$137 million.

Conceptual Mountain Park Expansion Model

PARK / RESERVE	EXISTING	EXPANSION	UNIT COST	TOTAL COST
Catalina State Park	5,511 (State)	2,320	\$5,000	\$11.6 M
Cienega Creek	4,105	500	\$5,000	\$ 2.5 M
Colossal Cave	2,342	4,070	\$5,000	\$ 20.4 M
Tortolita Mnt Park	3,545	7,920	\$5,000	\$ 39.6 M
Tucson Mnt Park	18,422	5,000	\$12,000	\$60 M
Other Park Lands		590	\$ 5,000	\$ 2.95 M
TOTAL	33,925	20,400		\$ 137 M

3. High Conservation Value Land on the Northwest Side

The cost of achieving a reserve increases dramatically when the land to be conserved is actually in the urbanizing areas. This subsection discusses the potential costs of obtaining a Section 10 permit through the conservation of lands that would create a reserve in northwest Tucson. Maps 8 and 9 show unincorporated vacant land within an area known as Recovery Area 3 for the pygmy-owl and a subset of that area, known as the High Conservation Value Area. This land is highly fragmented and expensive. A review of the appraised value of open space surrounding these areas in light of market factors provides guidance in estimating the cost per acre for open space acquisition. A budget of at least \$20,000 per acre should be used at this time. There are approximately 5,000 acres of vacant land in the unincorporated area of Recovery Area 3, and about 2,363 of this is in the High Conservation Value Area.

- Assuming all 5,000 acres could be acquired, a budget of at least \$100 million would be needed.

This reserve would be inadequate for multi-species protection. While it would likely exceed the land needed by Pima County to offset impacts to pygmy-owl habitat, pygmy-owl protection at the regional level would require strategies in other recovery areas too. For purposes of discussion, the following acreage might be assembled to create a reserve with a focus on the northwest side.

Conceptual Northwest Tucson Mitigation Model

PARK / RESERVE	ACRES	UNIT COST	TOTAL COST
Recovery Area 3 Land	5,000	\$20,000	\$100 M
Tortolita Mnt Park	7,920	\$5,000	\$ 39.6 M
Tucson Mnt Park	5,000	\$12,000	\$ 60 M
To Be Identified	2,480	\$5,000	\$ 12.4 M
TOTAL	20,400		\$ 212 M

4. Riparian Protection and Restoration

Riparian areas offer the greatest conservation opportunity per acre, given their importance to the majority of priority vulnerable species. Assuming a reserve of 20,400 acres in size, the cost of acquiring riparian areas can be calculated based on an estimated per acre cost.

For purposes of discussion a figure of \$2,000 per acre will be used for rural areas, which often coincide with ranch lands, and a figure of \$3,000 per acre will be used for riparian lands closer urbanization.

A 20,400 acre reserve comprised of 50 percent rural and ranch riparian lands, and 50 percent riparian lands closer to urbanization would cost \$51 million.

5. Conclusion

Ranch and riparian conservation offer the greatest scope at the least expense. Mountain Park expansion is more expensive, but perhaps more desired by neighborhood constituents. The conservation of land on the northwest side is costly and ultimately not sufficient to approach regional multi-species goals. This model will allow the Steering Committee and interested members of the public to weigh the trade offs of recommendations that they may forward.

B. Equitable Distribution of Mitigation Costs

Along with recommending the preferred cost range of the Section 10 permit, the distribution of costs is a discussion point for the community. The existing multi-species habitat conservation plans have treated this subject differently, but most adopt a principle which distributes costs fairly in accordance with benefits. In San Diego, initial proposals included the strategy of achieving 37 percent of the \$411 million preserve through development funding, such as exactions. Clark County Nevada adopted a \$550 per acre fee on the conversion of land for urbanization. Both of these methods garner more support from the development community than is traditional in Pima County.

On the other hand, there is greater justification for taxpayer participation in sharing costs for mitigation that covers the impacts of approved public improvement projects. Because of the specific nature of public improvement projects, their impacts are identifiable.

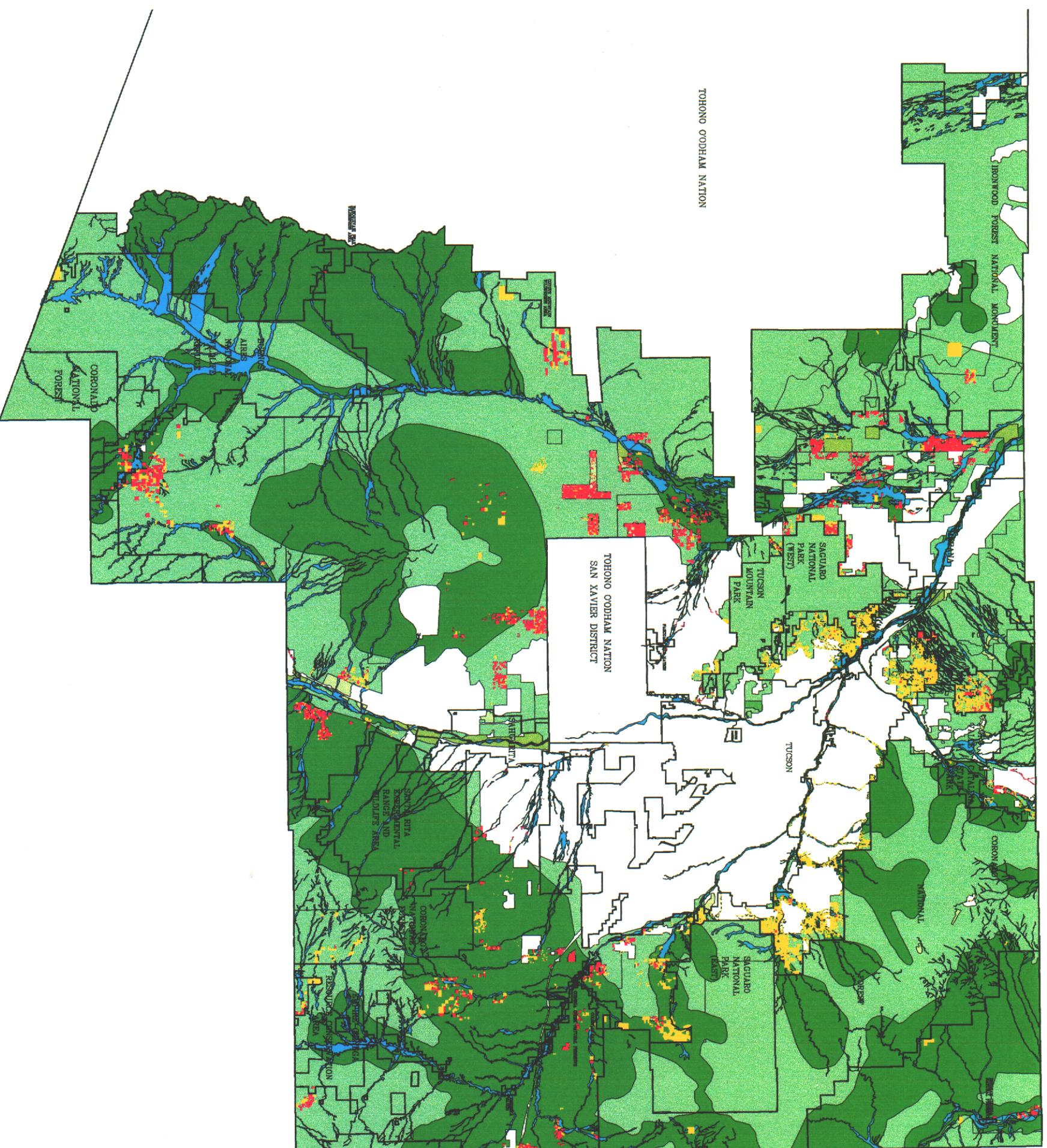
Past acquisitions of mountain parks or expansions to mountain parks have been paid primarily through general obligation bonds of the County, which is a debt instrument paid back through a secondary property tax levy on all property in Pima County. Therefore, park expansion, even though it could count as credit for a Section 10 permit, could be paid by the general taxpayer of Pima County as has been past practice.

It is reasonable to assume that certain costs of the Section 10 permit would be paid for by private beneficiaries. The discussion of what constitutes the best mechanism for achieving this end is an important one for the community and Steering Committee. However, it is not unreasonable to assume that half of Section 10 compliance costs should be paid by the beneficiaries.

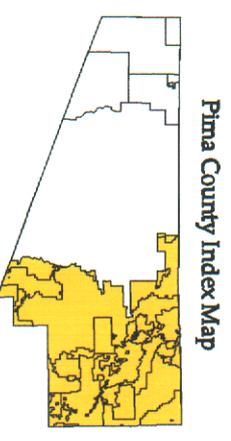
V. Conclusion

The cost of the Section 10 permit in Austin is quoted to be around \$100 million. The San Diego plan is estimated to cost around \$1 billion, substantially higher than early estimates. The Section 10 permit for unincorporated Eastern Pima County is not likely to approach the price range of Austin or San Diego. Some of the major determinants of whether Pima County will be required to mitigate at the high or low end of the range described in this paper include the mitigation ratio, the question of how far off site mitigation will be allowed, and what conservation initiatives in addition to acquisition will count toward the permit. This discussion paper simply introduces the range of options and some of the major discussion points for future public discussion.

Residential Categories in Unincorporated Pima County & Conservation Lands System



- Administrative Boundaries
- Agriculture Within Recovery Area
 - < SFR 11 parcels, 18 acres >
 - < MH 2 parcels, 1 acre >
- Biological Core
 - < SFR 1,850 parcels, 11,842 acres >
 - < MFR 11 parcels, 38 acres >
 - < MH 1,044 parcels, 5,922 acres >
 - < TH 11 parcels, 2 acres >
- Important Riparian Areas
 - < SFR 3,940 parcels, 6,561 acres >
 - < MFR 24 parcels, 63 acres >
 - < MH 1,006 parcels, 2,166 acres >
 - < TH 139 parcels, 18 acres >
- Multiple Use or Recovery Area
 - < SFR 9,002 parcels, 23,174 acres >
 - < MFR 8 parcels, 35 acres >
 - < MH 3,035 parcels, 10,360 acres >
 - < TH 50 parcels, 4 acres >
- Scientific Research Area
- Existing Development
 - < SFR 683 parcels, 1,372 acres >
 - < MFR 2 parcels, 3 acres >
 - < MH 1,966 parcels, 3,390 acres >
 - < TH 2 parcels, 1 acre >
- C.I.S. Exclusions
(Incorporated, Tribal or Out of Reserve)
 - Total SFR 15,486 parcels, 42,967 acres
 - Total MFR 45 parcels, 139 acres
 - Total MH 7,053 parcels, 21,838 acres
 - Total TH 202 parcels, 25 acres



Index Map Scale 1:1,500,000

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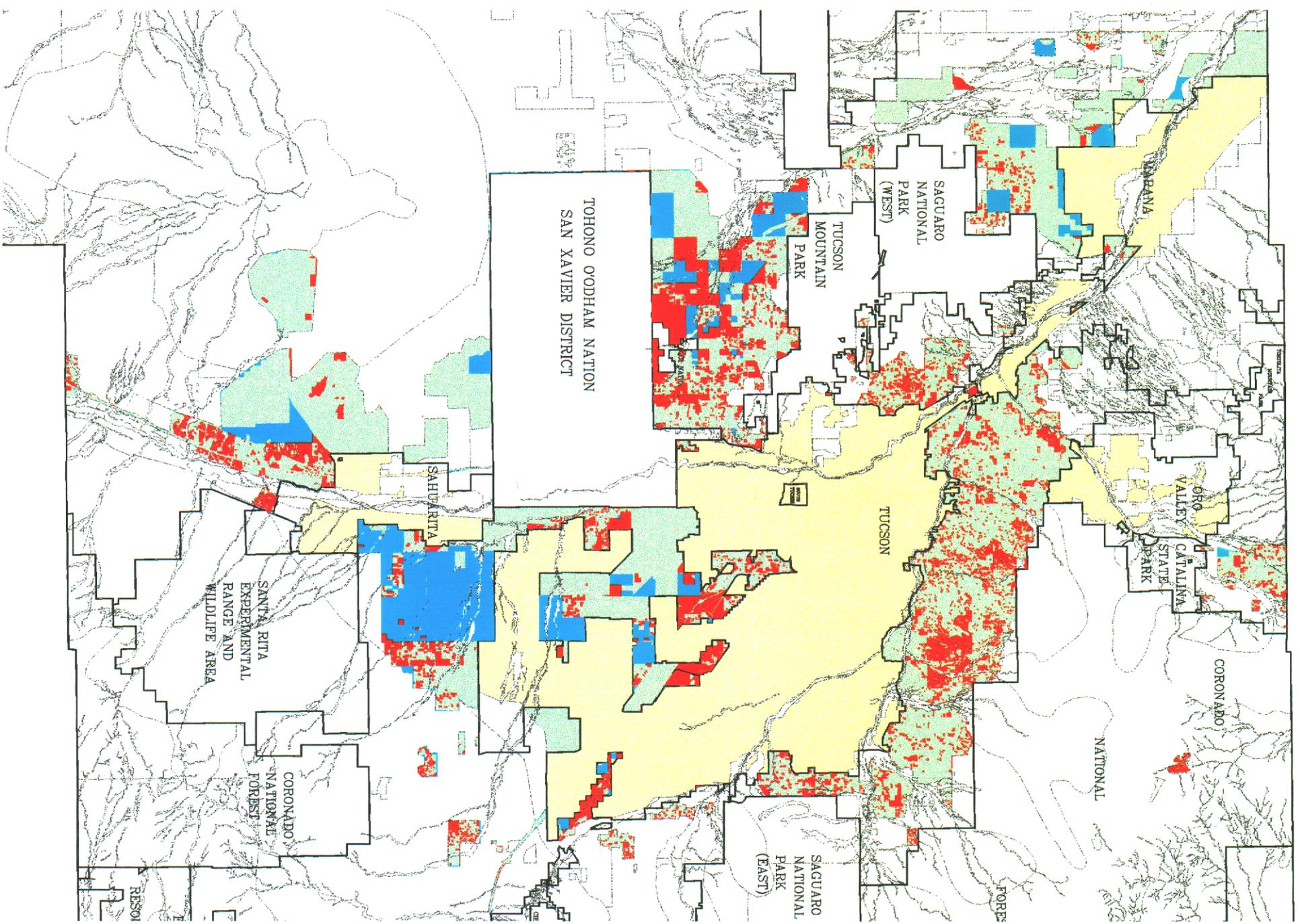
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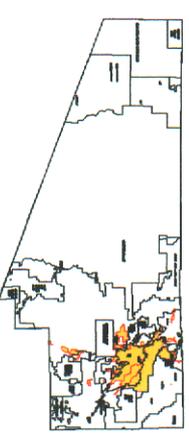


Vacant Land Within Unincorporated Pima County And Outside Of The Conservation Lands System

-  Administrative Boundaries
-  Conservation Lands System
-  Outside Reserve
-  Unincorporated < 351 sq. mi. >
-  Private Vacant Land < 37 sq. mi. >
-  State Vacant Land < 51 sq. mi. >



Pima County Index Map



Index Map Scale 1:1,000,000

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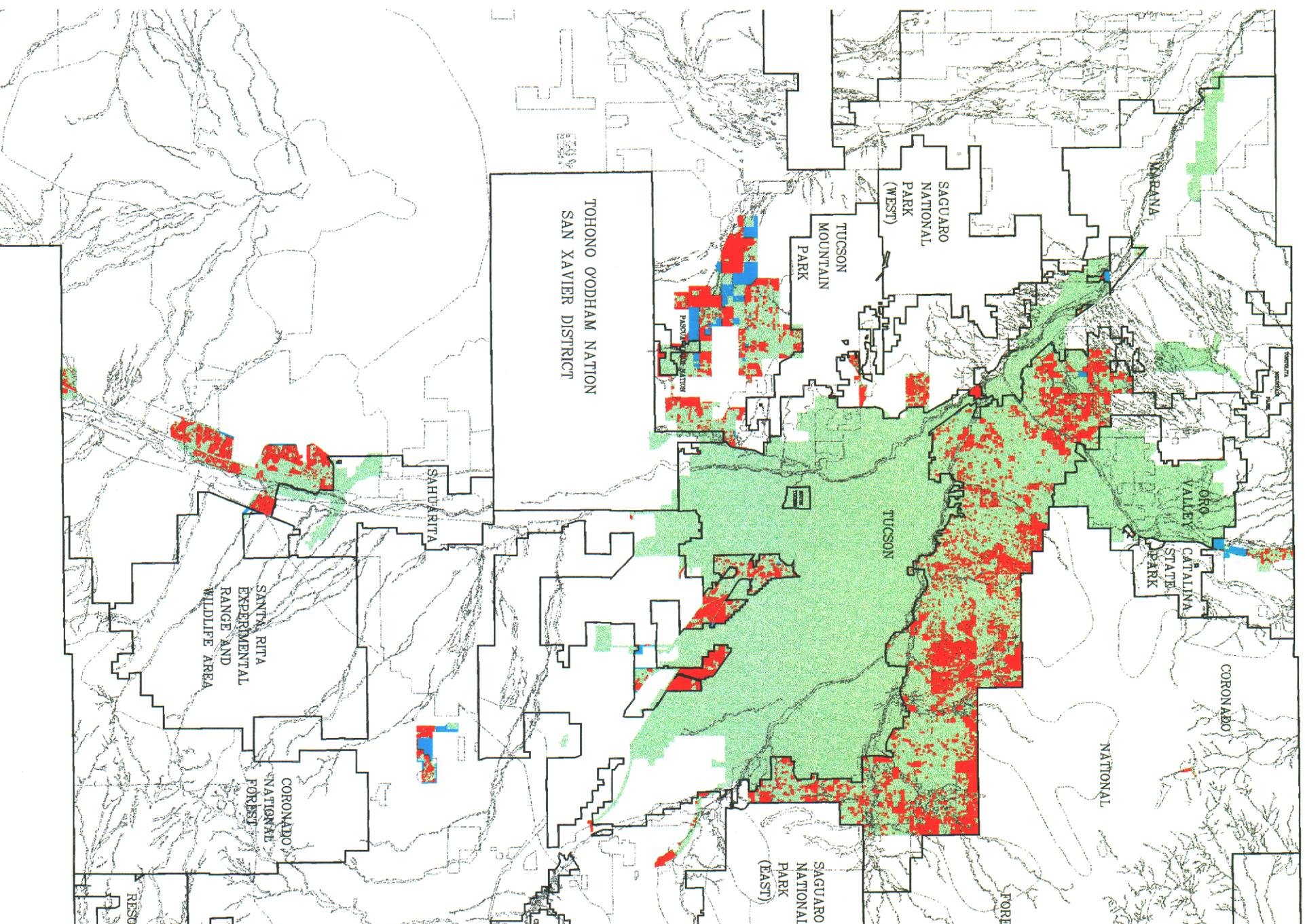


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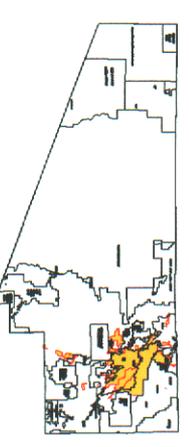


Vacant Land Within Unincorporated Pima County And Within The Sewer Service Area

-  Administrative Boundaries
-  Conservation Lands System
-  Sewer Service Area
-  Vacant Private Land < 23,200 ac. >
-  Vacant State Land < 3,013 ac. >



Pima County Index Map



Index Map Scale 1:1,500,000

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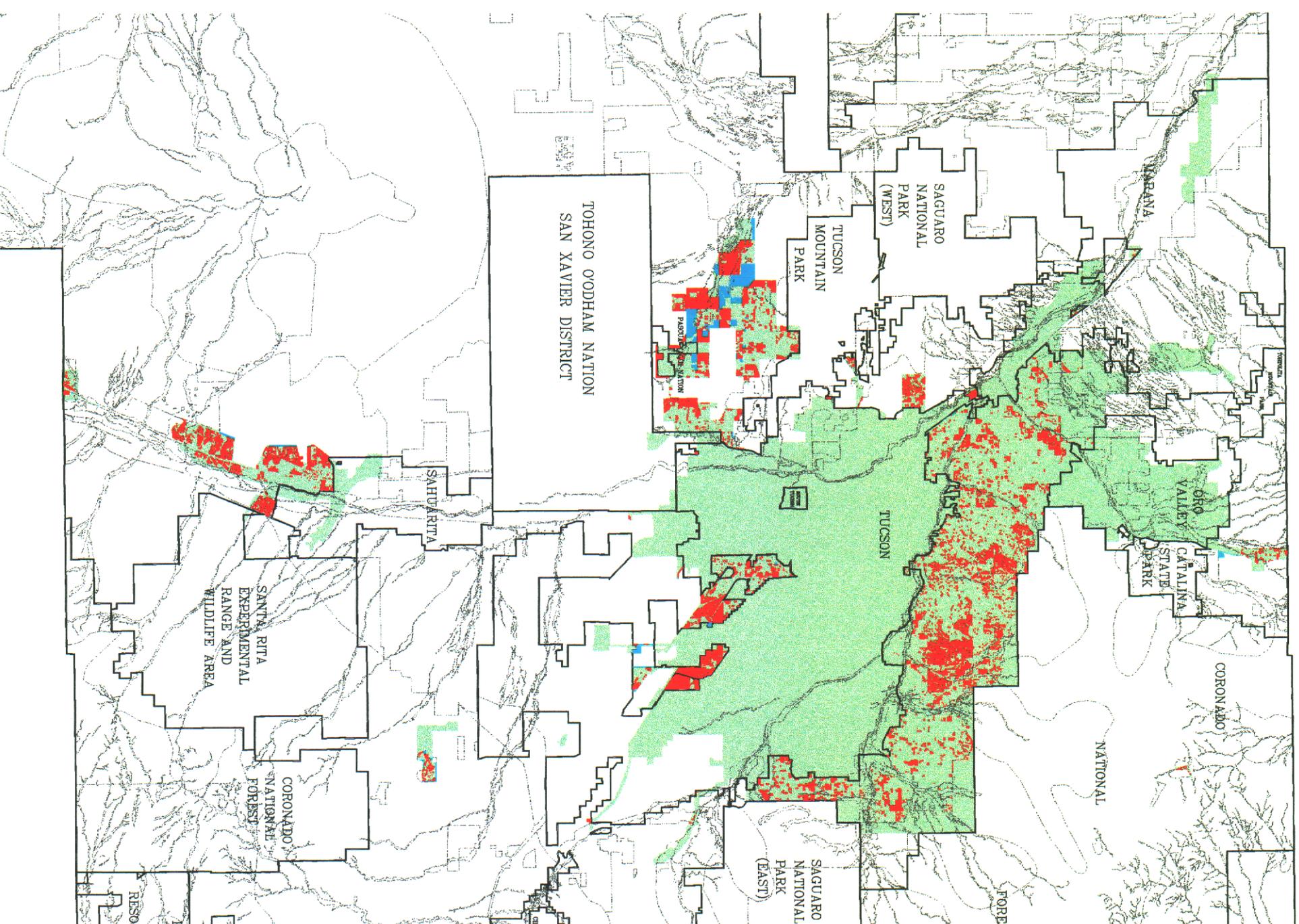


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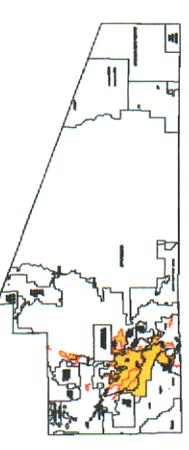


Vacant Land Within Unincorporated Pima County And Within The Sewer Service Area And Outside Of The Conservation Lands System

- Administrative Boundaries
- Conservation Lands System
- Sewer Service Area
- Vacant Private Land < 15,338 ac. >
- Vacant State Land < 1,800 ac. >



Pima County Index Map



Index Map Scale 1:1,000,000

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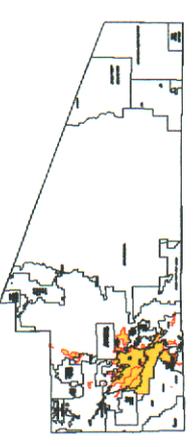
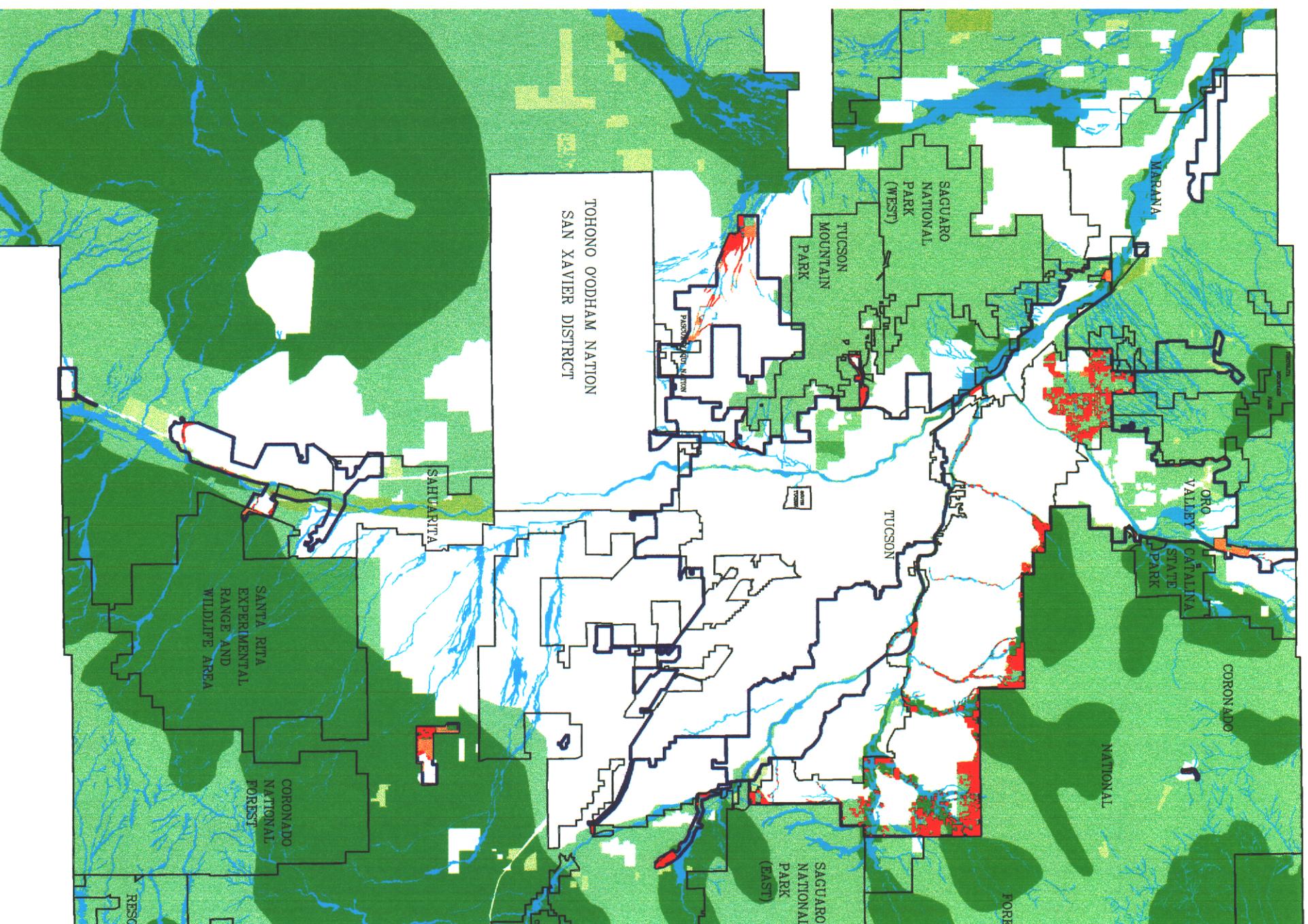


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Vacant Land Within Unincorporated Pima County, Sewer Service Area and Conservation Lands System

-  Administrative Boundaries
-  Sewer Service Area
-  Agriculture Within Recovery Area
-  Biological Core
-  Important Riparian Areas
-  Multiple Use or Recovery Area
-  Scientific Research Area
-  Existing Development
-  Vacant Private Land < 7861 ac. >
-  Vacant State Land < 1213 ac. >



Index Map Scale: 1:1,000,000

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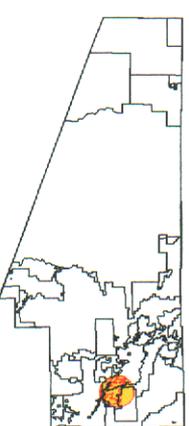
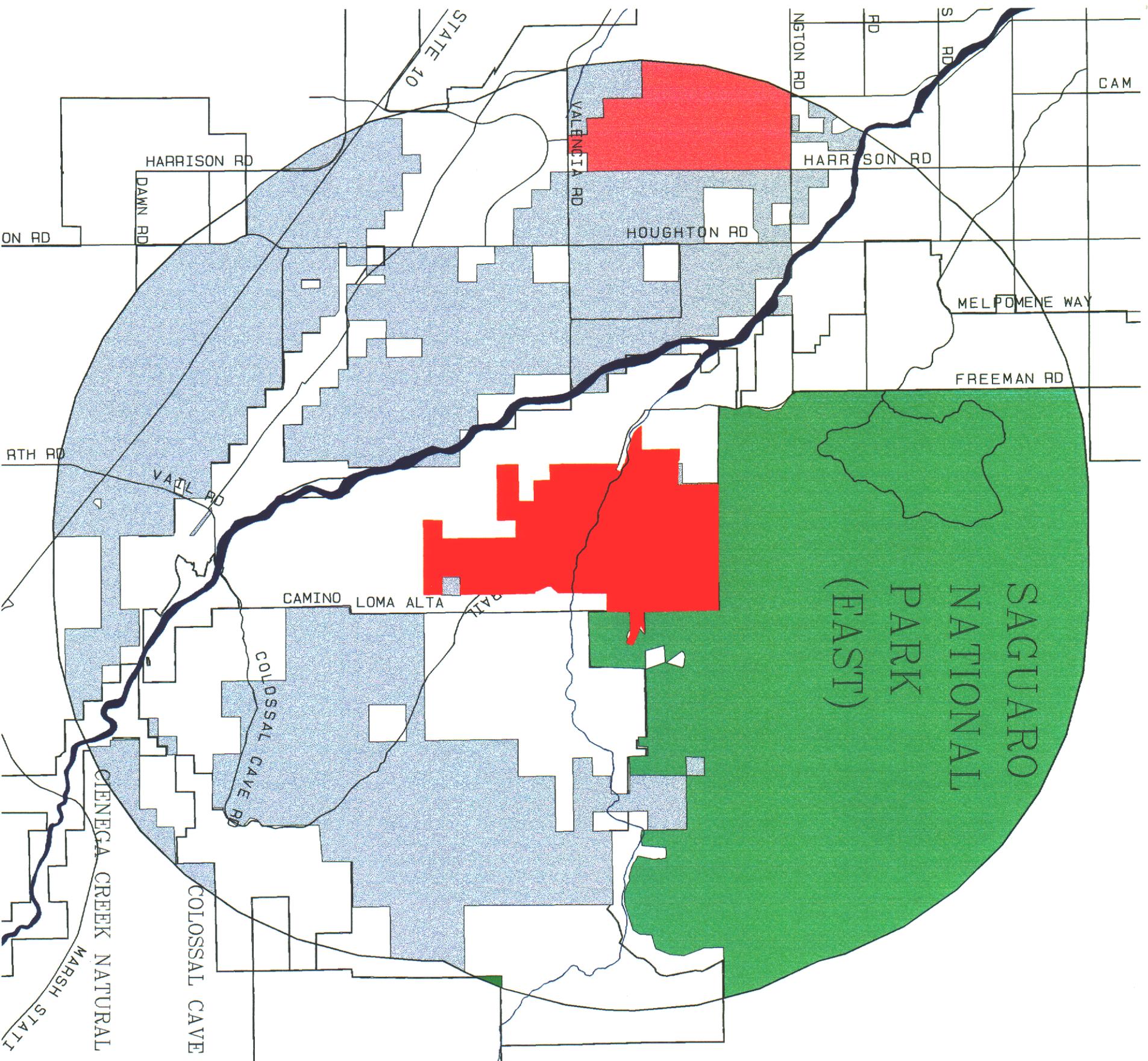
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State Trust Lands within 5 miles of the Rocking K Specific Plan Area

- Major Streets
- Major Washes
- Rocking K Specific Plan
- State Trust Land (29,947 acres)
- Saguaro National Park East
- Davis Monthan Air Force Base
- Private Lands (within 5 mile buffer)



Index Map Scale 1:1,000,000

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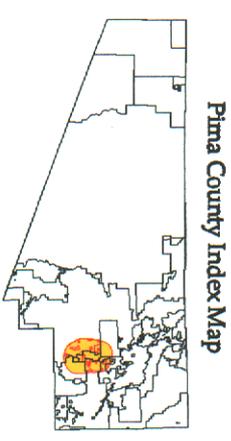
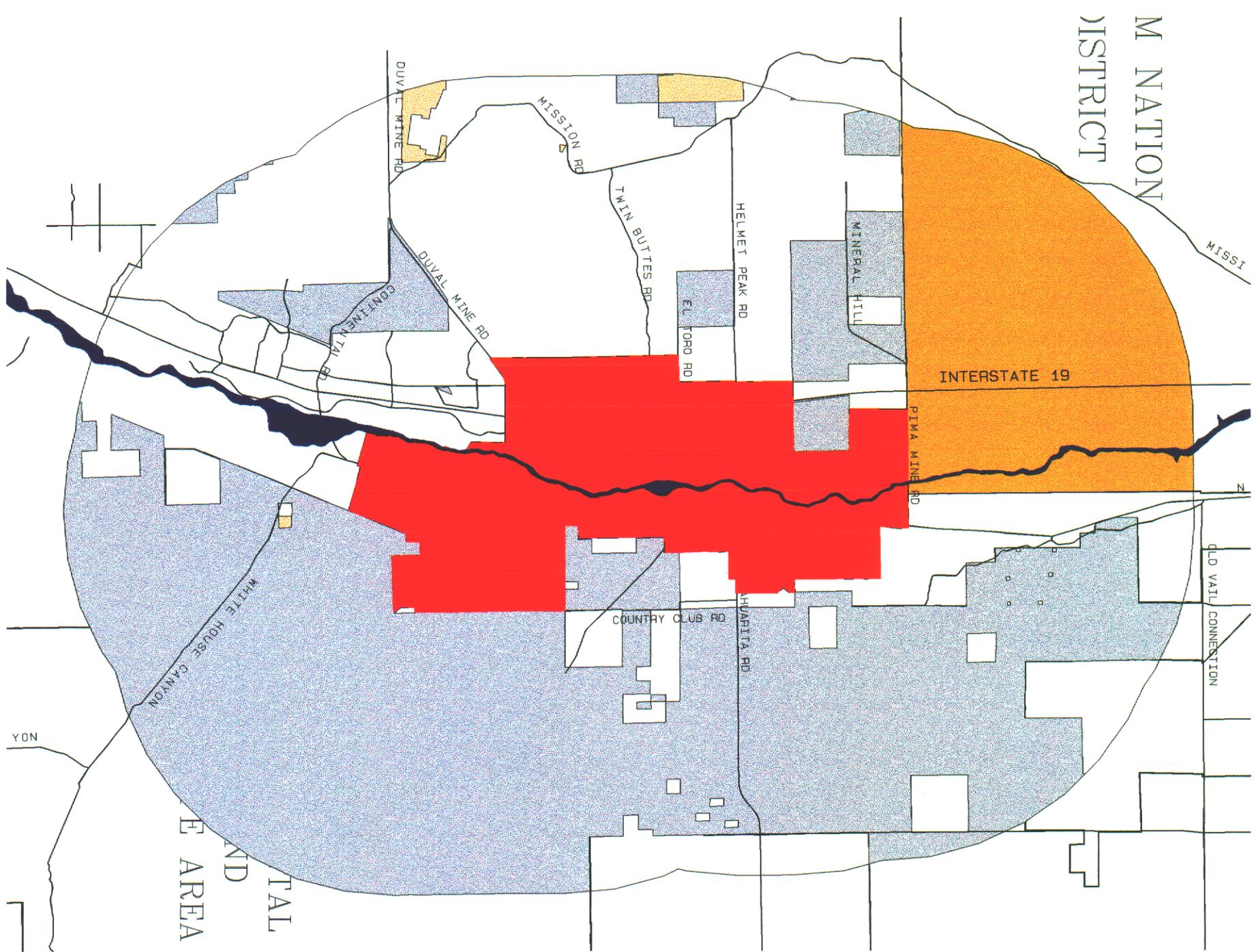


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State Trust Lands within 5 miles of the Town of Sahuarita

- Major Streets
- Major Washes
- Town of Sahuarita
- State Trust Land (65,340 acres)
- Private Lands (within 5 mile buffer)
- BLM
- Tribal



Index Map Scale: 1:1,000,000

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Scale: 1:44,000

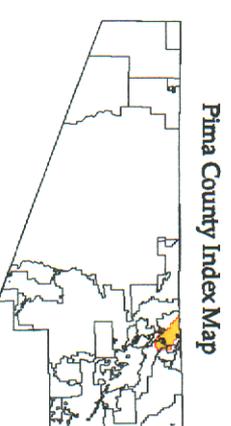
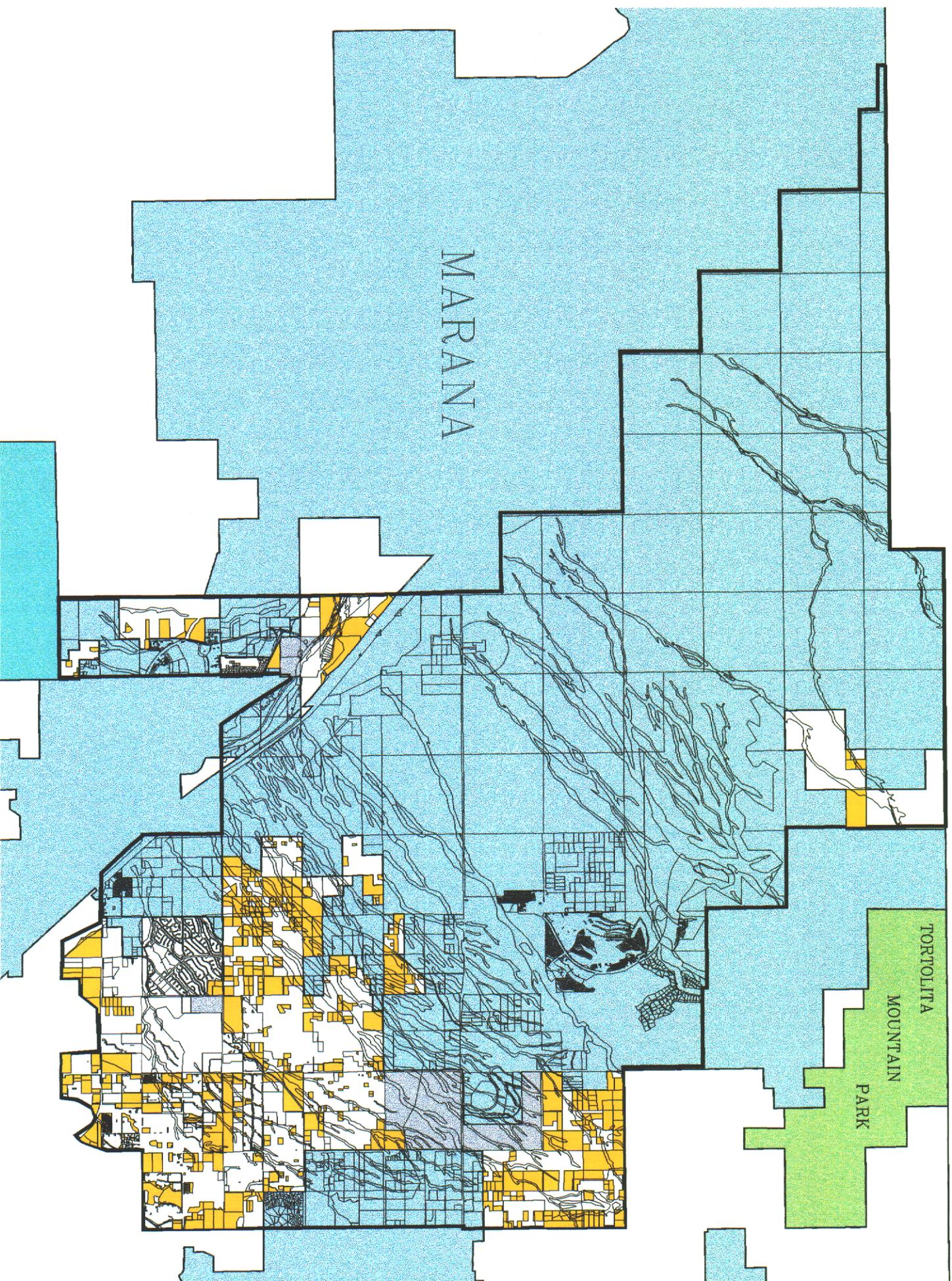


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TECHNICAL SERVICES
Pima County Technical Services
601 North Stone Avenue, 12075th Floor
Tucson, AZ 85701 FAX: 520-798-3429
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Private & State Vacant in Recovery Area 3, Unincorporated & CLS

-  Recovery Area 3
-  Administrative Boundaries
-  Parcel/CLS Lines
-  Private Vacant
(4,063 acres, \$52,427,357 FCV, 859 parcels)
-  State Vacant
(996 acres, \$10,472,031 FCV, 13 parcels)



Index Map Scale 1:1,000,000



Scale 1:30,000

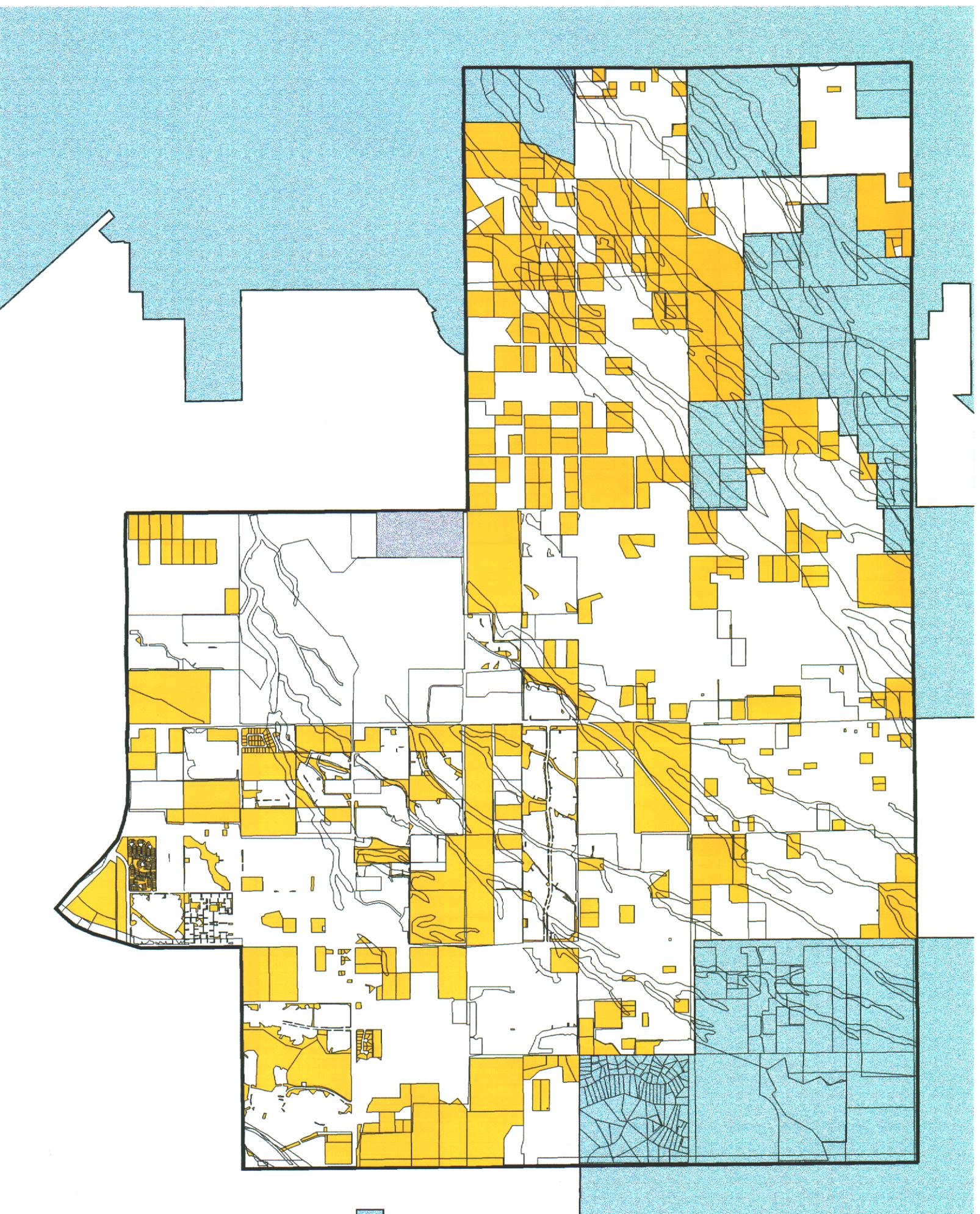
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This project is subject to the Department of Transportation Technical Services Division's User Action Agreement.

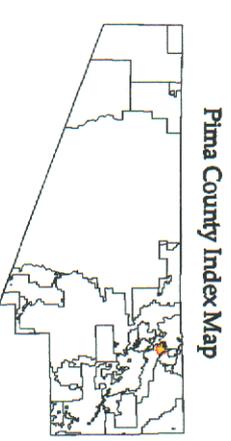
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Private & State Vacant in High Conservation Value Area, Unincorporated & CLS



-  High Conservation Value Area
-  Administrative Boundaries
-  Parcel/CLS Lines
-  Private Vacant
(2,312 acres, \$33,237,459 FCV, 620 parcels)
-  State Vacant
(51 acres, \$1,065,700 FCV, 2 parcels)
-  Incorporated Areas



Index Map Scale 1:1,200,000

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Population Estimates, Projections, and Growth Rates

YEAR	Marana	% Chg	Oro Valley	% Chg	Sahuarita	% Chg	South Tucson	% Chg	Tucson	% Chg	Uninc Pima County	% Chg	Total Pima County
1900									7,531		7,158		14,689
1910									13,191	75.16%	9,627	34.49%	22,818
1920									20,292	53.83%	14,388	49.45%	34,680
1930									32,506	60.19%	23,170	61.04%	55,676
1940							1,066		35,752	9.99%	36,020	55.46%	72,838
1950							2,364	121.76%	45,454	27.14%	93,398	159.29%	141,216
1960							7,004	196.28%	212,892	368.37%	45,764	-51.00%	265,660
1970	1,154		581				6,220	-11.19%	262,933	23.51%	80,773	76.50%	351,667
1980	1,647	42.72%	1,489	156.28%			6,554	5.37%	330,537	25.71%	191,216	136.73%	531,445
1990	2,187	32.79%	6,670	347.95%	1,629		5,171	-21.10%	405,390	22.65%	247,540	29.46%	666,880
2000	13,556	519.84%	29,700	345.28%	3,242	99.02%	5,490	6.17%	486,699	20.06%	305,059	23.24%	843,756
2010	46,078	239.91%	44,190	48.79%	6,491	100.22%	6,474	17.92%	540,307	11.01%	388,083	27.22%	1,031,627
2020	76,553	66.14%	59,388	34.39%	10,564	62.75%	7,151	10.46%	589,899	9.18%	462,689	19.22%	1,206,246
2030	99,328	29.75%	68,914	16.04%	14,275	35.13%	7,500	4.88%	631,889	7.12%	550,413	18.96%	1,372,320
2040	117,900	18.70%	76,123	10.46%	18,468	29.37%	7,500	0.00%	663,542	5.01%	639,082	16.11%	1,522,616
2050	124,232	5.37%	79,607	4.58%	23,374	26.56%	7,500	0.00%	683,037	2.94%	753,432	17.89%	1,671,182
YEAR	Maricopa County	% Chg	Cochise County	% Chg	Pinal County	% Chg							
1900	20,457		9,251		7,779								
1910	34,488	68.59%	34,591	273.92%	9,045	16.27%							Pima County growth rate since 1980 = 59%
1920	89,576	159.73%	46,465	34.33%	16,130	78.33%							Maricopa growth rate since 1980 = 103%
1930	150,970	68.54%	40,998	-11.77%	22,081	36.89%							Arizona growth rate since 1980 = 89%
1940	186,193	23.33%	34,627	-15.54%	28,841	30.61%							US growth rate since 1980 = 24%
1950	331,770	78.19%	31,488	-9.07%	43,191	49.76%							
1960	663,510	99.99%	55,039	74.79%	62,673	45.11%							Pima County growth rate since 1950 = 497%
1970	971,228	46.38%	61,918	12.50%	68,579	9.42%							Maricopa growth rate since 1950 = 825%
1980	1,509,175	55.39%	85,686	38.39%	90,918	32.57%							Arizona growth rate since 1950 = 584%
1990	2,122,101	40.61%	97,624	13.93%	116,397	28.02%							US growth rate since 1950 = 86%

2000	3,072,149	44.77%	117,755	20.62%	179,727	54.41%						
2010	3,709,566	20.75%	137,035	16.37%	199,715	11.12%				From 1990 to 2000, Marana experienced the city (519%)		
2020	4,516,090	21.74%	149,990	9.45%	231,229	15.78%				Oro Valley was second in the state (345%)		
2030	5,390,785	19.37%	160,049	6.71%	255,695	10.58%						
2040	6,296,219	16.80%	167,401	4.59%	273,057	6.79%						
2050	7,264,731	15.38%	174,556	4.27%	288,529	5.67%						



Pima Association of Governments
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 last updated 08/15/01

Summary
 Tables



REVISED DRAFT - 4/22/2002

PIMA ASSOCIATION OF GOVERNMENTS
POPULATION ESTIMATES AND PROJECTIONS

YEAR	MARANA POPULATION	MARANA ANNUAL CHANGE	MARANA PERCENT CHANGE	ORO VALLEY POPULATION	ORO VALLEY ANNUAL CHANGE	ORO VALLEY PERCENT CHANGE	SAHUARITA POPULATION	SAHUARITA ANNUAL CHANGE	SAHUARITA PERCENT CHANGE	SOUTH TUCSON POPULATION	SOUTH TUCSON ANNUAL CHANGE	SOUTH TUCSON PERCENT CHANGE	TUCSON POPULATION (REMAINDER)	UNINCORP. PIMA CO. ANNUAL CHANGE	UNINCORP. PIMA CO. PERCENT CHANGE	PIMA CO. POPULATION	PIMA COUNTY ANNUAL CHANGE	PIMA COUNTY PERCENT CHANGE
1950 41 census	1,674			1,489						6,554			390,537			531,443		
1980 71	1,762	88	5.26	1,846	357	23.98				6,555			332,639			530,282		
1981 71	1,745	-17	-0.96	2,144	298	16.14				6,439	-115	-1.75	343,450	2,341	1.22	547,027	15,584	2.93
1982 71	1,732	-13	-0.74	2,428	286	13.29				6,320	-119	-1.85	344,089	5,356	2.77	553,194	6,167	1.13
1983 71	1,713	-19	-1.10	2,722	293	12.06				6,209	-111	-1.76	349,235	6,836	3.44	566,328	12,134	2.18
1984 71	1,689	-14	-0.82	3,012	290	10.65				6,086	-123	-1.98	362,078	10,556	5.19	588,878	23,550	4.17
1985 71	1,818	129	7.08	3,635	623	20.68				5,969	-117	-1.92	372,295	12,218	5.65	611,471	22,993	3.84
1986 71	1,947	128	7.04	4,262	627	17.25				5,789	-170	-2.85	378,752	12,059	5.28	630,560	19,089	3.12
1987 71	2,066	119	6.11	4,882	620	14.55				5,616	-183	-3.16	389,372	4,302	1.79	646,064	15,494	2.46
1988 71	2,185	119	6.24	5,511	629	12.88				5,447	-169	-3.01	398,738	5,76	0.24	654,568	8,512	1.32
1989 71	2,487			6,670						5,269	-178	-3.27	398,922	1,284	0.32	665,251	865	0.10
1990 71	2,195	0	0.00	8,750	1,239	22.48	1,822			5,063			405,390			668,830		
1991 71	2,520	325	14.81	7,745	995	14.74	1,630	6	0.49%	5,164	-105	-1.99	402,460	2,336	0.98	683,178	7,928	1.21
1992 71	2,863	343	13.21	9,024	1,279	16.51	1,728	96	5.60%	5,305	141	2.73	409,755	2,160	0.88	674,075	10,890	1.64
1993 71	2,953	90	3.14	10,335	1,311	14.53	1,928	102	5.30%	5,452	147	2.77	417,314	3,203	1.29	696,426	12,351	1.83
1994 71	3,370	417	12.51	11,947	1,612	15.60	1,936	108	5.60%	5,465	13	0.24	424,733	6,976	2.77	702,315	15,989	2.31
1995 41 census	5,009			19,657			2,050	114	5.90%	5,487	2	0.04	433,335	7,901	3.05	723,199	20,884	2.97
1995 71	5,153	153	3.04	21,455	1,798	9.10	2,159	95	4.63%	5,473	6	0.11	445,289			843,726		
1996 71	5,958	805	15.62	21,407	2,667	15.46	2,145	95	4.63%	5,473	6	0.11	442,910	2,959	1.11	744,004	20,905	2.88
1997 71	6,919	961	16.13	22,834	1,427	6.67	2,255	110	5.19%	5,479	6	0.11	449,637	6,721	1.52	767,144	23,140	3.11
1998 71	9,955	3,046	44.02	25,455	2,621	11.48	2,476	221	9.80%	5,483	4	0.07	458,678	9,039	2.01	764,784	17,640	2.30
1999 71	12,350	2,395	23.93	27,280	1,825	7.17	2,945	469	18.94%	5,487	4	0.07	468,520	1,733	0.60	802,501	17,717	2.28
2000 41 census	13,556			29,700			3,242	365	12.39%	5,489	2	0.04	475,450	10,844	3.74	824,852	22,351	2.79
2001 71	14,048	492	3.63	30,257	557	1.88	3,226	16	0.49%	5,495	6	0.11	488,868	5,420	1.80	848,365	23,533	2.85
2002 71	15,765	1,717	12.24	32,520	2,263	7.48	4,615	1,289	38.79%	5,490	-5	-0.09	498,305	7,522	2.46	870,810	22,225	2.62
2003 71	17,099	1,334	7.83	34,746	2,227	6.74	5,072	462	10.00%	5,505	15	0.27	508,271	6,56	0.21	885,068	14,459	1.66
2004 71	19,224	2,125	11.00	37,346	2,600	7.56	5,838	761	15.00%	5,520	15	0.27	518,437	5,239	1.67	904,541	16,472	2.20
2005 71	21,664	2,440	10.50	39,932	2,588	6.74	6,714	876	15.00%	5,535	15	0.27	530,361	1,615	0.57	922,631	18,080	2.00
2006 71	23,717	2,053	8.61	41,554	1,622	3.95	7,495	1,208	18.00%	5,550	20	0.36	541,763	3,280	1.02	940,181	17,530	1.90
2007 71	26,208	2,491	9.39	43,749	2,241	5.12	8,307	1,584	20.00%	5,575	20	0.36	553,140	1,836	0.67	957,084	16,923	1.80
2008 71	28,359	2,151	7.59	46,385	2,636	5.90	9,288	2,091	22.00%	5,600	25	0.45	563,927	1,066	0.52	973,633	18,749	1.75
2009 71	30,000	1,641	5.47	49,073	2,684	5.47	10,172	2,900	25.00%	5,625	25	0.45	574,641	1,005	0.32	993,310	18,477	2.00
2010 71	31,073	1,073	3.42	51,243	2,170	4.28	11,115	3,624	26.00%	5,650	25	0.44	585,272	762	0.23	1,012,163	18,873	1.90
2011 71	32,419	1,346	4.29	53,744	2,525	4.88	12,115	4,693	23.78	5,675	25	0.44	595,807	260	0.08	1,030,908	18,725	1.85
2012 71	34,211	1,792	5.29	56,474	2,733	5.12	13,115	3,609	12.00	5,700	30	0.53	606,334	48	0.01	1,049,633	18,639	1.75
2013 71	36,115	1,904	5.34	59,343	2,869	4.83	14,115	2,241	5.00	5,725	30	0.52	616,861	3,476	1.05	1,068,358	19,747	1.70
2014 71	38,115	2,000	5.23	62,343	2,999	4.80	15,115	1,649	3.00	5,750	30	0.50	627,389	5,812	1.66	1,087,083	21,115	1.87
2015 71	40,211	2,100	5.16	65,443	3,098	4.78	16,115	1,249	2.00	5,775	30	0.49	637,920	7,422	1.82	1,105,808	22,511	2.00
2016 71	42,311	2,100	4.90	68,543	3,100	4.64	17,115	1,379	2.00	5,800	30	0.48	648,451	9,124	1.92	1,124,529	23,917	2.15
2017 71	44,411	2,100	4.65	71,643	3,100	4.50	18,115	1,523	2.00	5,825	30	0.47	658,982	10,631	1.85	1,143,246	25,322	2.22
2018 71	46,511	2,100	4.46	74,743	3,100	4.35	19,115	1,677	2.00	5,850	30	0.47	669,513	12,139	1.99	1,161,963	26,727	2.30
2019 71	48,611	2,100	4.27	77,843	3,100	4.20	20,115	1,824	2.00	5,875	30	0.47	680,044	13,647	1.99	1,180,680	28,132	2.38
2020 71	50,711	2,100	4.08	80,943	3,100	4.05	21,115	2,000	2.00	5,900	30	0.47	690,575	15,155	1.99	1,199,397	29,537	2.45
2021 71	52,811	2,100	3.89	84,043	3,100	3.90	22,115	2,241	2.00	5,925	30	0.47	701,106	16,663	1.99	1,218,114	30,942	2.52
2022 71	54,911	2,100	3.70	87,143	3,100	3.70	23,115	2,441	2.00	5,950	30	0.47	711,637	18,171	1.99	1,236,831	32,347	2.59
2023 71	57,011	2,100	3.51	90,243	3,100	3.50	24,115	2,641	2.00	5,975	30	0.47	722,168	19,679	1.99	1,255,548	33,752	2.66
2024 71	59,111	2,100	3.32	93,343	3,100	3.30	25,115	2,841	2.00	6,000	30	0.47	732,700	21,187	1.99	1,274,265	35,157	2.73
2025 71	61,211	2,100	3.13	96,443	3,100	3.10	26,115	3,041	2.00	6,025	30	0.47	743,231	22,695	1.99	1,292,982	36,562	2.80
2026 71	63,311	2,100	2.94	99,543	3,100	2.90	27,115	3,241	2.00	6,050	30	0.47	753,762	24,203	1.99	1,311,699	37,967	2.87
2027 71	65,411	2,100	2.75	102,643	3,100	2.70	28,115	3,441	2.00	6,075	30	0.47	764,293	25,711	1.99	1,330,416	39,372	2.94
2028 71	67,511	2,100	2.56	105,743	3,100	2.50	29,115	3,641	2.00	6,100	30	0.47	774,824	27,219	1.99	1,349,133	40,777	3.01
2029 71	69,611	2,100	2.37	108,843	3,100	2.30	30,115	3,841	2.00	6,125	30	0.47	785,355	28,727	1.99	1,367,850	42,182	3.08
2030 71	71,711	2,100	2.18	111,943	3,100	2.10	31,115	4,041	2.00	6,150	30	0.47	795,886	30,235	1.99	1,386,567	43,587	3.15
2031 71	73,811	2,100	1.99	115,043	3,100	1.90	32,115	4,241	2.00	6,175	30	0.47	806,417	31,743	1.99	1,405,284	44,992	3.22
2032 71	75,911	2,100	1.80	118,143	3,100	1.80	33,115	4,441	2.00	6,200	30	0.47	816,948	33,251	1.99	1,424,001	46,397	3.29
2033 71	78,011	2,100	1.61	121,243	3,100	1.60	34,115	4,641	2.00	6,225	30	0.47	827,479	34,759	1.99	1,442,718	47,802	3.36
2034 71	80,111	2,100	1.42	124,343	3,100	1.40	35,115	4,841	2									

