

DRAFT

The Role of Adaptive Management

January 2001



Sonoran Desert Conservation Plan

Pima County, Arizona
Board of Supervisors

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County Administrator

Chuck Huckelberry

January 2001



MEMORANDUM

Date: January 22, 2001

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

From: C.H. Huckelberry
County Administrator 

Re: **The Role of Adaptive Management**

Background

As part of the biological evaluation for the Sonoran Desert Conservation Plan, Recon Consulting, working with the Science Technical Advisory Team and participating jurisdictions, will draft an Adaptive Management Plan and an Adaptive Management Manual. The attached study entitled *The Role of Adaptive Management*, provides a template for these documents and it frames the issues that will be considered and developed during the next two years.

The Role of Adaptive Management is a preliminary analysis that has been drafted during the last months in conjunction with participating federal agencies. Land managing entities provided information and later a detailed review of fact sheets that summarize each reserve in terms of its size, ownership, authorizing documents, land use activities, priority vulnerable species, exotic and non-native species, baseline information, GAP status, acquisitions, management plans, research, monitoring and recovery programs.

The study proposes eight Reserve Management Areas that include land managers who could work together in implementing the Sonoran Desert Conservation Plan across administrative boundaries. One proposed area, the Ironwood / Avra Valley Reserve Management Area will be able to serve as a demonstration Reserve Management Area since Pima County and the Bureau of Land Management are discussing joint planning for the Ironwood Forest National Monument. This is a substantial planning effort that will reflect the importance of public lands at both the local and federal level as much as the initiative reflects Pima County's strong collaborative relationship with the Bureau of Land Management.

The Role of Adaptive Management begins with a twenty-eight page discussion, divided into six parts: part one defines adaptive management in accordance with United States Fish and Wildlife Service standards; part two describes the character of the existing reserve system; part three establishes a conceptual framework for a future reserve system; part four proposes a conceptual framework for implementing the Adaptive Management Plan; part five discusses the components of the Adaptive Management program; and part six provides a summary and conclusion. Following the twenty-eight page discussion, there are three appendices that represent major compilations of information: (1) species tables that relate the location of priority vulnerable species to existing reserves; (2) fact sheets for each public reserve that summarize the management plans for each; and (3) management issues within each existing reserve area. The study is summarized in this memorandum.

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Report

Adaptive Management Defined -- Pages one through six of the attached study define and explain adaptive management. Citing the United States Fish and Wildlife Service standard, the study defines adaptive management as: "... an integrated method for addressing uncertainty in natural resource management ... for examining alternative strategies for meeting measurable biological goals and objectives and then, if necessary, adjusting future conservation management actions to what is learned." An Adaptive Management Plan and Manual will be provided to the Service as part of the Sonoran Desert Conservation Plan. Land reserve managers and areas included in the scope of the study are listed on pages five and six, including:

- United States Bureau of Land Management
- United States Bureau of Reclamation
- United States Department of Defense
- United States Fish and Wildlife Service
- United States Forest Service
- United States National Park Service
- Pima County Government
- The Nature Conservancy
- The State of Arizona
- The City of Tucson

The Character of the Existing Reserve System -- Pages seven through fifteen of the study describe the existing reserve system as one that is biased toward the protection of medium to high elevation landscape and habitats. The lack of connectivity is a weakness in the reserve system that is not offset by the size of existing protected land areas. The recent addition of lower elevation reserves to the system signals improvement to the overall reserve potential. The Ironwood Forest National Monument and the Las Cienegas National Conservation Area improve the diversity of conserved landscapes. Riparian revegetation and restoration projects also offer improvements to the existing system.

Conceptual Framework for a Future Reserve System -- Pages sixteen and seventeen of the study describe how the mapping for the species potentially covered by the Sonoran Desert Conservation Plan will -- when it is finalized in March -- be analyzed to determine what percent of the species distribution falls within existing core reserves, or within areas that might serve as reserve expansions, corridors or connections.

Conceptual Framework for Implementing the Adaptive Management Plan -- Pages eighteen through twenty include a conceptual structure for implementing the Adaptive Management Plan proposed by Recon. A Science Team that provides technical and scientific review of the program would work with County staff and serve as a liaison to the Board, which is the decision making body for program and funding matters. The Science Team would also work with a Land Managers Committee made up of all government entities that have a stake in the various reserve management areas in Pima County.

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Proposed Reserve Management Areas are described in the report to include these teams:

- Altar Valley Land Managers Team
- Catalina / Tortolita Mountains Land Managers Team
- Ironwood / Avra Valley Land Managers Team
- Las Cienegas Land Managers Team
- Rincon Mountains Land Managers Team
- San Pedro Valley Land Managers Team
- Santa Rita Mountains Land Managers Team
- Tucson Basin Land Managers Team
- Tucson Mountains Land Managers Team
- Western Pima County Land Managers Team

Component Parts of the Adaptive Management Program -- Pages twenty-one through twenty-six describe the elements of the future Adaptive Management Plan, which provides a preview of program components for the Sonoran Desert Conservation Plan. The study indicates that the key elements of an effective adaptive management strategy are (1) inventory, (2) monitoring, and (3) research.

- Inventory

The ongoing obligation to identify and close data gaps will be part of the workplan and may involve efforts such as field inventories and surveys, refining and updating species accounts, improving the Geographic Information System data base, and maintaining a data base that reflects program activity.

- Monitoring

Monitoring efforts that are a foreseeable aspect of the Adaptive Management Program include accounting for incidental take, species status tracking, habitat condition assessments, program progress reports, and data base development for monitoring purposes.

- Research

Research projects that will likely be a part of the Adaptive Management Plan include continued identification of threats and stressors, research to improve understanding of ecosystem interactions, identification of indicators of conservation effectiveness, research carried out directly in response to management issues and concerns, design of protocols and sampling methods, and identification of management actions that will prevent listings and the decline of species.

Pages twenty-four through twenty-six describe generally the role of these subjects in adaptive management: protection, restoration, and enhancement; public information and education; and land use policies and actions.

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Conclusion

The attached study on *The Role of Adaptive Management* is intended to facilitate the discussions among the land managing jurisdictions that are participating in the development of the Sonoran Desert Conservation Plan. When the Science Technical Advisory Team finalizes species and habitat goals in the next two months for the Sonoran Desert Conservation Plan, managers of existing reserves will be able to identify management and conservation actions that would support the regional conservation initiative. From there, management plans and implementation strategies can be discussed in a coordinated fashion.

c: Tohono O'odham Nation
San Xavier District
City of South Tucson
Department of the Interior
Fish and Wildlife Service
Metropolitan Water District
National Park Service
Science Technical Advisory Team Members
United States Air Force
United States Army Corps of Engineers
United States Bureau of Land Management
United States Bureau of Reclamation
United States Environmental Protection Agency
United States Forest Service
United States Geological Survey
Town of Marana
Town of Oro Valley
Tucson

DRAFT
Role of Adaptive Management
in the Sonoran Desert Conservation Plan:
Outline of Considerations & Recommendations
for the AMP Manual

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B:	List of Reserves and Priority Vulnerable Species
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I. Introduction

A. What is Adaptive Management?

The U.S. Fish and Wildlife Service (USFWS) defines adaptive management as

... an integrated method for addressing uncertainty in natural resource management (Holling 1978, Walters 1986, Gunderson 1999) ... for examining alternative strategies for meeting measurable biological goals and objectives and then, if necessary, adjusting future conservation management actions to what is learned ...” (U.S. Department of the Interior 2000).

An Adaptive Management Plan (AMP) and Manual are documents that will be submitted to the U.S. Fish and Wildlife Service as part of the Multi-Species Habitat Conservation Plan (MSHCP) of the Sonoran Desert Conservation Plan (SDCP). The MSHCP will identify specific goals and objectives for the Priority Vulnerable Species and their supporting habitats; the AMP provides the management framework to meet those goals and serves as a tool to implement the MSHCP.

The ultimate goal of the AMP is to provide a scientifically credible plan that provides for the adaptive management of biological resources in Pima County and a program that can be effectively implemented. The AMP will be developed as a flexible, iterative approach to long-term management of biological resources that is directed over time by the results on ongoing monitoring activities and other information. It will establish measurable biological objectives that broadly include (1) maintenance of the long-term net habitat value and functional relationships of the ecosystems in Pima County with a particular emphasis on species covered by the SDCP and (2) recovery of listed species and conservation of unlisted covered species.

Adaptive management is a way of adding rigor to resource management decisions—something that is done every day on many levels by persons using a variety of approaches (all with different levels of political concerns, historic precedence, analysis, and evaluation).

Traditional decision-making approaches have a high rate of success in addressing relatively straightforward problems in situations where there are many known parameters, high confidence in data, high level of certainty, and fairly predictable outcomes.

Adaptive management, while not the solution for all situations, offers great usefulness to large, complex systems where data is limited, the systems and interactions are unique, and uncertainty is high. A fundamental underpinning of adaptive management is that management must proceed even though we do not have all the information we would like and even though we may not be sure what the effects of management might be: we proceed on the basis of the best scientific information available.

Adaptive management then becomes more than a way to achieve objectives, it becomes a tool to gain critical knowledge—a process for learning about the resources and systems being managed. Learning is an inherent objective of adaptive management. As more is learned, policies can be adapted to (1) improve management success and (2) better respond to changing future conditions.

Adaptive management has different goals than traditional resource management. One overall goal of adaptive management is to develop an optimal management capacity within a range of acceptable alternatives, rather than maintaining a single optimal state or condition of the

resource. (This ties in with current theories in conservation biology which promotes tolerance for variations in populations and habitat quality if there is sufficient population and health overall.)

What is the difference between what we are doing now and adaptive management? In some cases there is little difference, but in other cases there is a great difference. In the future, reserve managers that are signatories to the MSHCP will be agreeing to uphold and implement the recommendations of the AMP. In support of this effort there will be a rigorous structure for measuring compliance and an ever-growing body of scientific data to apply to the task. The answer then lies in the degree of rigor and a set of agreed upon standards for measuring success.

B. Continuous Feedback Loop

The measurable goals and objectives that are established for the species covered by the permit will be coupled with scientifically established methods for monitoring the success in achieving those goals. A monitoring plan is a critical, required component of the AMP and is part of the continuous feedback loop that allows for change in the management strategies (Figure 1). We will be required to monitor both the effectiveness of management strategies as well as compliance with the HCP commitments. This is all part of the reporting requirement to the USFWS. Scientific research will also have a role in implementing the AMP. In order to fill information gaps and to verify basic assumptions behind the monitoring program, research will be designed to test hypotheses. Monitoring and research will provide additional information that is needed to understand species' needs and distributions and assign conservation priorities.

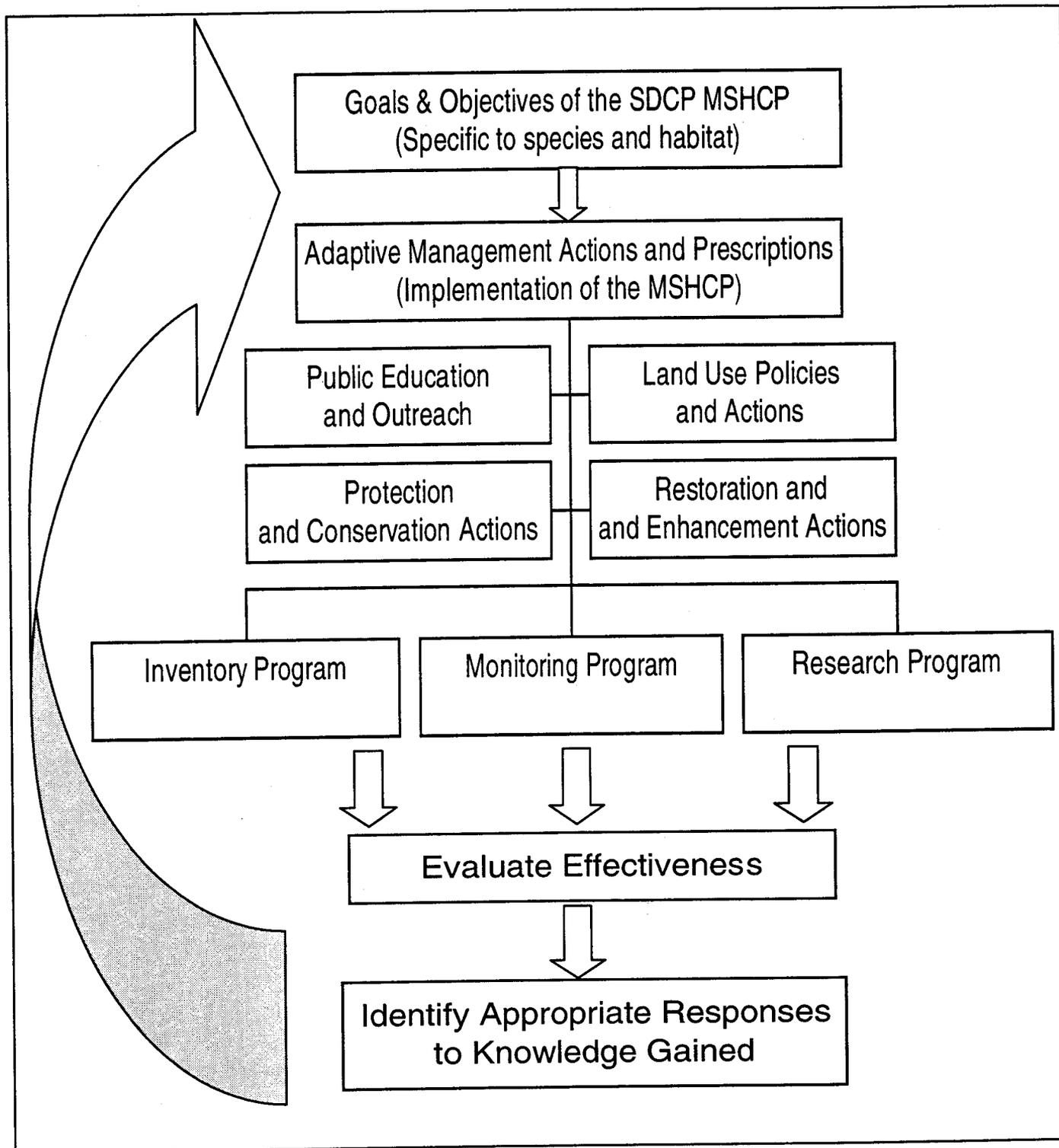
C. Support for the AMP

In the end, the AMP will only be supported by those resource agencies and land managers that see it as a highly valuable tool that offers long-term benefits to all involved. To initiate that, Pima County will continue to seek an interchange of ideas, at a federal, state, and local level. The SDCP and MSHCP process, studies, and permit requirements offer a framework and hub for scientific review—a data repository that will extend beyond the permitting needs of Pima County—that can be of beneficial use to all agencies and their staff.

D. Purpose of this Document: Intent and Approach

The purpose of this introductory document is to begin a dialogue on adaptive management and to broadly identify existing management practices, issues, and opportunities affecting the Priority Vulnerable Species short-listed by the Science Technical Advisory Team (STAT) and the RECON team. (Tables that list the Priority Vulnerable Species and the reserves in which they are found or thought to occur are included as Appendixes A and B.) Once the main issues affecting these and related biological resources have been identified, we will work towards the development of management prescriptions, inventory and monitoring programs, and research projects that can address specific needs and circumstances. These will be more fully developed during the spring of 2001 and described in the draft Adaptive Management Plan and Manual in May of 2001.

The SDCP reserve design process focuses on ownership and management, but between these the greater importance lies in the management of landscapes, rather than any given owner, manager, or government structure. Ideally, how management affects and can improve biodiversity over time is what is significant, always looking at the future management condition



Adaptive Management Feedback Loop

Figure 1

and long-term management needs. The objective is to tailor management and monitoring plans to the landscape needs rather than to jurisdictional boundaries.

E. Resource Management Partners

This approach necessitates a collaborative effort, with cooperation among federal, state, county, local and private managers. Ideally, the team should be as inclusive as possible. Partnering with agencies such as the U.S. Bureau of Reclamation and the U.S. Army Corps of Engineers, which are not really land managers per se, is important. The role of the Arizona Game and Fish Department is also pivotal. Although Arizona Game and Fish owns and manages few tracts of land, they are charged with conserving and managing Arizona's wildlife resources across public and private boundaries.

The participants in this management process have been identified to date as shown in Table 1. (It is anticipated that this outline may be expanded as new partners who manage lands that are, or will become, part of the reserve system are realized.)

F. "Reserve Fact Sheets"

Pima County staff and RECON are reviewing the documents that describe the management for existing reserves. Management and other basic information for most of the reserves is summarized by the draft "Reserve Fact Sheets," included here as Appendix C. Not all of the existing reserve areas have management plans; for other reserves, management plans are being formulated or updated. RECON and Pima County staff have initiated meetings with the management partners who reviewed and edited the fact sheets that apply to their specific land area(s). Included in their review are the sections on management issue identification, which forms the basis for further management analysis. We will continue to meet with management partners and expand upon these "Reserve Fact Sheets" as new information becomes available or is identified by the reserve managers.

TABLE 1
SUMMARY OUTLINE OF LAND RESERVE MANAGERS AND AREAS

Managing Entity	Land Reserves
U.S. Bureau of Reclamation (managing agreement with Pima County)	CAP Tucson Mitigation Corridor
U.S. Department of Defense	Barry M. Goldwater Gunnery Range Davis-Monthan Air Force Base
U.S. Fish and Wildlife Service	Cabeza Prieta National Wildlife Refuge Wilderness Buenos Aires National Wildlife Refuge
U.S. Forest Service, Coronado National Forest	Santa Catalina Ranger District <ul style="list-style-type: none"> • "Unreserved" Forest Lands • Butterfly Research Natural Area • Santa Catalina Research Natural Area • Pusch Ridge Wilderness Area Nogales Ranger District <ul style="list-style-type: none"> • "Unreserved" Forest Lands • Mount Wrightson Wilderness Sierra Vista Ranger District (Whetstone Mts.)
U.S. Bureau of Land Management (BLM)	Baboquivari Wilderness Coyote Mountains Wilderness Ironwood National Monument <ul style="list-style-type: none"> • Silverbell Mts. Resource Conservation Area (RCA) • Waterman Mts. Area of Critical Environmental Concern • Other BLM lands Las Cienegas National Conservation Area (NCA) <ul style="list-style-type: none"> • Empire-Cienega RCA • Other BLM lands Other BLM lands in vicinity of Ajo and elsewhere in Pima County
U.S. National Park Service	Saguaro National Park, East and West Units, and Wilderness Areas Organ Pipe Cactus National Monument
State of Arizona <ul style="list-style-type: none"> • Arizona State Parks Board • University of Arizona • State Land Department 	Catalina State Park Santa Rita Experimental Range State Trust Lands, including leased ranchlands and Arizona Preserve Initiative lands
Pima County	Tucson Mountain Park Tortolita Mountain Park Colossal Cave Mountain Park Arthur Pack Regional Park Agua Caliente Park Empirita Ranch Cienega Creek Preserve Other County-owned lands, including river parks, other flood control land and other acquired parcels

TABLE 1
SUMMARY OUTLINE OF LAND RESERVE MANAGERS AND AREAS
(continued)

Managing Entity	Land Reserves
The Nature Conservancy	Buehman Canyon Bingham Cienega (management agreement with Pima County)
City of Tucson	A-7 Bellota Ranch Wide range of parks, riparian restoration projects, and other acquired parcels.
Other jurisdictions and private lands	Parks and open space land, lands with conservation easements or commitments.

II. Character of the Existing Reserve System

A. Eastern Pima County

Currently, the land reserve system in eastern Pima County is biased towards the protection of medium to high elevation landscape and habitats. This is reflected by the large areas of Coronado National Forest and the Saguaro National Park that cover the Catalina, Rincon, Santa Rita, and Tucson Mountains, as well as some of the land within the County's Mountain Parks. The resulting "sky islands" effect provides opportunities for conserving species and habitats of higher elevations over large acreages but makes no specific provisions for connectivity between mountainous areas. For many species, particularly wide-ranging wildlife, the sheer size of reserve areas cannot compensate for this weakness of isolation. Additionally, these medium to high elevation landscapes are managed for multiple uses that pose potential threats to sensitive species: passive and active recreation, hunting, grazing, mining, and a full spectrum of other uses. The local climate by its nature results in greater recreational pressures on landscapes at higher and cooler elevations, especially during the hot summer months.

Exceptions to this higher elevation bias in eastern Pima County are the mid and lower elevation landscapes with the reserves of Buenos Aires National Wildlife Refuge, Las Cienegas NCA, Empire-Cienega RCA, Ironwood National Monument (including the Silverbell Mountains RCA and the Waterman Mountains ACEC), Cienega Creek and Bingham Natural Preserves, Agua Caliente Park, and Pima County Mountain Parks.

B. Western Pima County

Western Pima County land reserves are characterized by lower elevation landscapes within the Cabeza Prieta Wildlife Refuge, the Goldwater Gunnery Range, the Organ Pipe Cactus National Monument, and BLM lands in the vicinity of the town of Ajo. These are managed by the USFWS, Department of Defense, National Park Service, and BLM, respectively. The expanse of these lands, their locations so distant from large towns or cities, and their position along the U.S./Mexico border make them vulnerable to impacts from unauthorized uses and impose complex and at times dangerous management circumstances.

In summary, the existing land reserve system in Pima County, while expansive and inclusive of many landscape and habitat types, has historically been developed with a bias towards higher elevations and with no real priority for building an interconnected system. The structure of federal, state, local, and private management and ownership is one in which each entity develops and implements a management strategy that does not always relate or correspond to management circumstances outside its jurisdictional boundaries.

C. Current Trend: Towards Greater Connectivity and Diversity of Landscapes

Recent developments in expanding the reserve system have shifted the focus on lower elevation lands that *do* provide more of a connection to other reserve areas and, at the same time, include a wider diversity of landscapes and species' habitats. Representative examples include:

- The Buenos Aires National Wildlife Refuge—established to protect vast grasslands and other habitats in Altar Valley, in part by excluding cattle ranching activities;
- The newly created Ironwood National Monument—protecting a huge acreage of the ironwood plant community while maintaining viable ranching operations;

- The recently created Las Cienegas NCA, encompassing the previously established Empire-Cienega RCA—protecting expanses of grasslands, a rich riparian ecosystem, and also maintaining viable ranching operations; and
- A wide array of individual riparian restoration projects.

Although not restricted to lower elevations, riparian areas of the Sonoran desert are more fully developed at low to medium elevations. In Pima County the riparian areas have been greatly reduced- eliminated or jeopardized by historic water and land uses. Our efforts to protect riparian resources have increased in recent years, but regulations vary by jurisdiction and there is a lack of protection at the regional or system level. Nevertheless, riparian protection and restoration projects of various scales have been initiated, as have associated wetlands projects, and more are in the planning stage. The U.S. Army Corps of Engineers (USACE) continues to play a lead role in many of these projects, not only in jurisdictional authority, but also in planning, funding and implementation. (Example: Congress recently enacted an Energy and Water appropriations bill that includes \$12 million in funds for a variety of projects in Pima County, the majority of which are flood control projects in partnership with USACE and at least one is specifically earmarked for the Sonoran Desert Conservation Plan. Several of these projects, such as the Paseo de las Iglesias and other wetland/riparian restoration projects have been described by SDCP documents.)

In general we are seeing the reserve system become one that places a greater emphasis on connectivity, contiguity and that represents a fuller cross-section of representative landscapes- a reserve system that can support and conserve a higher level of plant and wildlife diversity. As stated above, this necessitates a collaborative effort, with cooperation and partnering among federal, state, county, local and private managers. It heightens the need for managers of lands adjacent to other reserve areas to examine differences in management and work towards more “seamless” management (e.g., abutting unfenced reserve areas with conflicting grazing prescriptions).

D. Conservation Status of Existing Reserves as a Function of Management and Allowed Uses

A previous SDCP document titled “Land Stewardship in Pima County” (Pima County 2000) discussed the Gap Analysis Program (GAP), a national effort establishing a hierarchy of the conservation status of lands. The concept and theory behind this program is that land management decisions have a direct effect on the degree of impacts to species and their habitats, including, but not limited to, loss of vegetative cover and general habitat fragmentation. This degree of allowed impact relates to the potential for maintaining biodiversity and is therefore considered an important measure of the conservation status of lands.

The current conservation status of lands within Pima County (both within and outside of existing reserves) was determined by geographic information system (GIS) analysis for the “Biological Stress Assessment” report (RECON 2000) and has been updated using more current land cover data. The conservation status, assigned by management categories, summarizes the patterns of existing biodiversity protection and shows opportunities for establishing future protection within a reserve design. GAP used the following criteria to determine management status (Crist and Csuti 1997, Crist et al. 1998).

Conservation GAP Status Criterion

- Status 1a: An area that has permanent protection from conversion of natural cover and a mandated management plan to maintain a natural state within which disturbance events are allowed or mimicked through management.
- Status 1b: Same as 1a but may have uses that detract from the quality of the land (e.g., visitor centers, high levels of traffic, heavily used trails, and campgrounds). Up to 5% of the land may be managed in an unnatural state.
- Status 2: An area that has permanent protection from conversion of natural cover and a mandated management plan in operation but receives uses or management practices that degrade the quality of existing natural communities, including suppression of natural disturbance. Over 5% of the land may be managed in an unnatural state.
- Status 3a: An area managed for biodiversity but not subject to permanent protection.
- Status 3b: An area having permanent protection from conversion of natural land cover for the majority of the area and subject to extractive uses of either broad, low-intensity type (e.g., logging) or localized intensive type (e.g., mining, bombing, residential). It also confers protection to federally endangered and threatened species throughout the area.
- Status 4: An area allowing conversion of natural land to unnatural throughout or an area with unknown status.

Using Pima County assessor's parcel code GIS data, RECON further defined Status 4 as follows for the purpose of reserve design considerations:

- Status 4a: Unprotected private or public lands without existing land uses which limit the value for conservation.
- Status 4b: Unprotected private or public lands with no existing development, with allowed land uses that limit the value for conservation.
- Status 4c: Unprotected private or public lands with existing land use designations for increased intensity of land uses.
- Status 4d: Unprotected private or public lands with proposed or pending development projects.
- Status 4e: Tohono O'odham reservation lands
- Status 4f: Developed lands
- Status 4x: Lands with unknown status (most likely developed lands without parcel codes).

These criteria were applied to the lands in Pima County and conservation status was assigned, reflecting the gradient of uses and activities that are allowed (Figure 2). The GAP status identified for each reserve is listed in Table 2, with comments on the reasons for status assignment.

TABLE 2
CONSERVATION GAP STATUS OF EXISTING RESERVES

Reserve Name	Reason for Status Placement
GAP Status 1a	
Baboquivari Wilderness	Wilderness areas are managed under the mandates provided in the Wilderness Act of 1964. The wilderness designation gives permanent, legal protection to land resources.
Buenos Aires National Wildlife Refuge	BANWR does not have an official management plan. As a National Wildlife Refuge System, the reserve management is dictated by the National Wildlife Refuge Administration Act and Executive Order 12996.
Cienega Creek Natural Preserve	A portion of Cienega Creek NP is managed under Conditions, Covenants, and Restrictions, which provide permanent protection for certain resources and restrictions for activities.
Santa Catalina Research Natural Area (Coronado National Forest)	RNAs are managed for wilderness values and uses while providing opportunities for nondisruptive research and education. Use restrictions may be imposed as necessary.
Butterfly Research Natural Area (Coronado National Forest)	RNAs are managed for wilderness values and uses while providing opportunities for nondisruptive research and education. Use restrictions may be imposed as necessary.
Rincon Mountain Wilderness (Coronado National Forest)	Wilderness areas are managed under the mandates provided in the Wilderness Act of 1964. The wilderness designation gives permanent, legal protection to land resources.
Coyote Mountain Wilderness	Wilderness areas are managed under the mandates provided in the Wilderness Act of 1964. The wilderness designation gives permanent, legal protection to land resources.
Organ Pipe Cactus National Monument Wilderness	Wilderness areas are managed under the mandates provided in the Wilderness Act of 1964. The wilderness designation gives permanent, legal protection to land resources.
Saguaro National Park Wilderness	Wilderness areas are managed under the mandates provided in the Wilderness Act of 1964. The wilderness designation gives permanent, legal protection to land resources.
The U.S. Bureau of Reclamation Wildlife Mitigation Corridor	This small reserve is intended for use as a CAP canal crossing for wildlife. The corridor is managed to prohibit future developments within the reserve, other than existing or future wildlife improvements.
GAP Status 1b	
Buehman Canyon (The Nature Conservancy)	TNC lands have permanent protection and are managed to maintain a natural state and natural processes. A portion of Buehman Canyon has an active mining claim.

TABLE 2
CONSERVATION GAP STATUS OF EXISTING RESERVES
(continued)

Reserve Name	Reason for Status Placement
Cabeza Prieta National Wildlife Refuge and Cabeza Prieta Wilderness	The refuge and the wilderness have permanent protection and a mandated management plan committed to maintain a natural state within the reserve. Both the Cabeza Prieta Refuge and Wilderness have been placed in Status 1b due to military activities that may detract from the quality of land.
Pusch Ridge Wilderness (Coronado National Forest)	Wilderness areas are managed under the mandates provided in the Wilderness Act of 1964. The wilderness designation gives permanent, legal protection to land resources. The Pusch Ridge Wilderness is located near a metropolitan area and is heavily used by visitors.
Mt. Wrightson Wilderness (Coronado National Forest)	Wilderness areas are managed under the mandates provided in the Wilderness Act of 1964. The wilderness designation gives permanent, legal protection to land resources. This wilderness experiences heavy visitation.
Saguaro National Park (Rincon and Tucson Mountain Districts)	Saguaro National Park is permanently protected and has a mandated management plan. Both areas outside the wilderness areas are heavily visited and have visitor centers.
GAP Status 2	
Tucson Mountain Park	Tucson Mountain Park is bisected with roads and heavily used trails. Two commercial enterprises are also located in the park.
Organ Pipe Cactus National Monument	OPCNM is heavily visited and Highway 85 runs through the reserve. The monument has also has a visitor center and campgrounds, with development plans for new facilities.
Catalina State Park	Over 5% of the park is developed.
Ironwood National Monument	The newly created monument is permanently protected and lacks a management plan. Depending on management practices, this reserve may change GAP status.
GAP Status 3a	
Bingham Cienega Natural Preserve	This reserve does not have permanent protection.
Cienega Creek Natural Preserve	This portion of the reserve does not have permanent protection.
Agua Caliente Regional Park	Public park with potential for establishment of native fish.
Empire-Cienega Resource Conservation Area	The Empire-Cienega falls within the pending Las Cienegas National Conservation Area. Establishment of the NCA will provide the area with permanent legislative protection, increasing the GAP status. A draft management plan is due out in the fall of 2000.
Colossal Cave Mountain Park	Not subject to permanent protection or a management plan.

TABLE 2
CONSERVATION GAP STATUS OF EXISTING RESERVES
 (continued)

Reserve Name	Reason for Status Placement
Tortolita Mountain Park	Not subject to permanent protection or a management plan.
GAP Status 3b	
Barry M. Goldwater Gunnery Range	The gunnery range is used as aerial target practice.
Arthur Pack Regional Park	Public park with multiple uses.
Southeast Regional Park	Public park with multiple uses.
Empirita Ranch	Not subject to permanent protection or grazing management. A total of 1,600 feet of groundwater pumping per year by others is permitted, though not yet used.
Unreserved Coronado National Forest	Subject to a management plan. Allows logging, mining, and other uses that may be detrimental to preserving natural resources.
Santa Rita Experimental Range	The range is used for ecological and rangeland research. Its purpose is to explore ways to manage rangelands for a variety of uses and may involve the introduction of exotic species, brush control, and other uses detrimental to maintaining biodiversity.

Reviewing the rationale for the reserves' GAP status with the distribution of potential general levels of potential threats and stressors (as depicted by the amount and pattern of land in each conservation status category as of February 2000 [Pima County 2000], shown in Figure 2 and summarized below in Table 3), certain general conclusions emerged:

- Status 1a: 15% of all land in Pima County is within Status 1a, the highest protection, with 443,524 acres of that total managed by the U.S. Fish and Wildlife Service; 388,810 acres managed by the National Park Service; 41,806 acres managed by the U.S. Forest Service; 7,182 acres managed by the Bureau of Land Management, and 1,243 acres managed by Pima County.
- Status 1b: 2.7% of all land in Pima County is within Status 1b, managed by four stewards: U.S. Fish and Wildlife Service (77,003 acres); U.S. Forest Service (57,120 acres); National Park Service (19,238 acres); and The Nature Conservancy (2,793 acres).
- Status 2: 0.7% of all land in Pima County is within Status 2, with five stewards: Pima County (18,112 acres); National Park Service (13,994 acres); Arizona State Parks Board (5,453 acres); Bureau of Land Management (3,245 acres); and Bureau of Reclamation (2,717 acres).
- Status 3a: 0.05% of all land in Pima County is within Status 3a, with Pima County managing 2,643 acres and The Nature Conservancy managing 180 acres at this level.
- Status 3b: 8% of all land in Pima County is within Status 3b, with five stewards: U.S. Forest Service (238,328 acres); Bureau of Land Management (132,275 acres); University of Arizona (51,984 acres); Department of Defense (44,278 acres); and Pima County (5,261 acres).
- Status 4: 73.5% of all land in Pima County is within Status 4, for which there is currently no protection against conversion of natural cover to unnatural cover.
- The opportunity for development of meaningful reserve design alternatives, as represented by conservation status 3b and 4a lands, is substantial. More than 1.65 million acres (48% of the County exclusive of the Tohono O'odham lands) are in these categories, which although not currently managed for conservation per se, are also not committed to more intensive uses and management.
- Because of the existing level of threats and stressors and the limited opportunities for increasing the amount of conserved lands within the Tucson metropolitan area, conservation planning should focus on protective management of key resources (e.g., riparian and aquatic habitats, cactus ferruginous pygmy-owl habitat) and the provision of corridors and connections between more appropriate and feasible conservation areas.
- Conservation planning should focus on the expansion and augmentation of existing reserve areas to (1) provide for coverage of additional conservation targets and (2) increase the coverage of underrepresented conservation targets and landscape connections between the existing reserve core areas.
- Habitat fragmentation and degradation as the result of urbanization, roads and highways, backcountry roads/trails, and other linear infrastructure elements represent a significant

threat to conservation throughout Pima County. Some of the related impacts can be addressed by altering management practices and policies.

- Finally, the opportunities for improving the conservation status are many and varied. They include (but are not limited to) developing management plans for reserve areas that currently have none, offering permanent protection to reserve areas that now have only temporary protection, fine-tuning management to protect high-priority areas, and establishing new management protocols where warranted.

III. Conceptual Framework for Future Reserve System

A. Preliminary Reserve Categories by Conservation Status

Understanding the current conservation status of Pima County's reserve system lands is a good starting point for building a framework for addressing the conservation and management needs of the Priority Vulnerable Species. Conceptually, if we collapse and simplify the GAP status categories, we can establish preliminary reserve planning categories based on management as follows:

**TABLE 3
PRELIMINARY RESERVE CATEGORIES BY CONSERVATION STATUS**

Preliminary Reserve Planning Categories	GAP Status Categories
<ul style="list-style-type: none">• "Core" reserve areas	Public lands with conservation management in place (1a, 1b, 2, 3a)
<ul style="list-style-type: none">• Expansions, additions, and buffers• Corridors & connections• Matrix landscapes (riparian ecosystems, upland communities, ranchlands)	Public and private lands with no specific conservation management but with few, if any, incompatible uses (3b, 4a)
<ul style="list-style-type: none">• Corridors & connections• Buffers	Public and private lands with some incompatible uses and potential for conversion to more intensive uses (4b, 4c)
<ul style="list-style-type: none">• Urban landscapes (urban parks and open space with a certain level of biological value)	Public or private lands (within developed urban areas) that may have little or low biological or conservation value but may offer significant value in terms of their microenvironments, educational opportunities, and possible connectivity to other reserve areas (i.e., linear parks and riparian restoration projects within the urban area) (4d)
<ul style="list-style-type: none">• Areas outside of reserve system	Public and private lands with incompatible uses; Tohono O'odham lands

B. Current Conservation Status of "Species-rich" Areas

By starting with the conservation status of lands, we establish a baseline upon which we can layer the known potential habitat value for the Priority Vulnerable Species. Areas of medium and high habitat value for each species can be summed to represent areas of high diversity of Priority Vulnerable Species (Table 4). Combining this "species-richness" layer (or individual species habitat value layers) with the existing reserves and their conservation status allows an assessment of species-rich areas contained within or missing from the existing reserve system. Based on our current land cover data, species distribution data (modeled habitat values), and current levels of management, we know that significant species-rich areas occur outside of the "Core Reserve" areas.

TABLE 4
RESERVE PLANNING STATUS OF MEDIUM AND HIGH POTENTIAL HABITAT

Preliminary Reserve Planning Categories	Percent of Medium/High Habitat within Each Category
"Core" reserve areas (1a, 1b, 2, 3a)	18
Potential reserve expansions, additions, connections, and buffers (3b, 4a)	49
Potential reserve corridors, connections, or buffers (4b, 4c)	10
Areas outside of reserve system (4f)	2
Tohono O'odham Nation (4e)	21

*Determined as a sum for all Priority Vulnerable Species.

As shown above, approximately one-third of Pima County (excluding the Tohono O'odham Nation) is within the existing reserve system. However, less than 20 percent of the medium and high potential habitat for the Priority Vulnerable Species is within the conceptual "Core Reserve" areas. Nearly half of these species-rich areas are on public or private lands with no specific conservation management (3b, 4a). This discrepancy points to an opportunity to evaluate management for these lands before incompatible uses that would preclude conservation efforts are established.

C. Checks to Avoid Overemphasis of Conservation Status

The GAP status classification system is geared toward land cover and the degree to which management provides security against land conversion or fragmentation. As such, it is not designed to address the conservation needs of all species, particularly wildlife. A generic application of the system, or even retooling of the system as it applies to Pima County, would not necessarily benefit species for which the subtleties of classification levels make little difference. For example, in general, the loss of water and the presence of exotic species pose a greater threat to aquatic species than loss of vegetative cover. And the frogs and other aquatic species within Saguaro National Monument East Wilderness are threatened by the degree of increasing urbanization adjacent to its boundaries—in spite of the Status 1a of their habitat areas. Fish within National Forest lands may be no more vulnerable to impacts than the fish in the BLM Empire Ranch or the Cienega Creek Preserve, despite the GAP classification differences.

For these reasons, the GAP classification will not be used as a stand-alone measure of an area's potential for conserving Priority Vulnerable Species of Pima County. Rather, it will be used as a complementary component of assessing management needs and opportunities, with explicit ties to the conservation needs and quantitative goals identified for each of the covered species. That species-specific information is being gathered and analyzed by STAT, STAT's expert review team, County staff, and the RECON team and will be presented in concurrent or upcoming documents (i.e., Habitat Suitability Modeling, Vulnerable Species Goals, Combined Species Document, and Reserve Design Recommendations).

IV. Moving from the Existing Reserve System to the Conceptual Framework

Once the areas of medium and high potential habitat for the Priority Vulnerable Species are identified and finalized, we can overlay that information for all the species or suites of species and compare that with existing levels of management/conservation status. This will be a first-cut look at areas of biological importance that are within or outside the current reserve system. Further, it will provide insight on the level of conservation afforded under current management and direction on areas where management may need to be altered or fine-tuned to afford better conservation of the Priority Vulnerable Species. Also, areas of species richness that are outside of reserve boundaries may be considered for acquisition or other conservation means. (Those considerations will be made in the context of costs, species goals, habitat goals, and a range of other reserve design factors.)

The Adaptive Management Plan, when fully complete, will specify management and conservation measures that are most likely to provide for the effective implementation of the MSHCP. These measures, and their associated implementation work plans, will be reviewed and updated on a regular basis by an implementation team.

A. Conceptual Structure for Implementing the AMP

For the purposes of initiating discussion, a conceptual structure for implementing the AMP has been developed by RECON. It is shown on Figure 3. This structure would establish a general framework for cooperation and participation among managers. It reflects a committee of resource managers, organized by areas. The sub-teams of the committee would function as the management team for the areas, referred to as Reserve Management Areas. The intent is to have all managers of a given area working together to achieve the same biological goals. In this way the management goals can focus on systems, regardless of jurisdictional boundaries. Incompatibilities along boundaries can be minimized in an effort to achieve "seamless" management. Partnerships to share information and responsibilities can be better established.

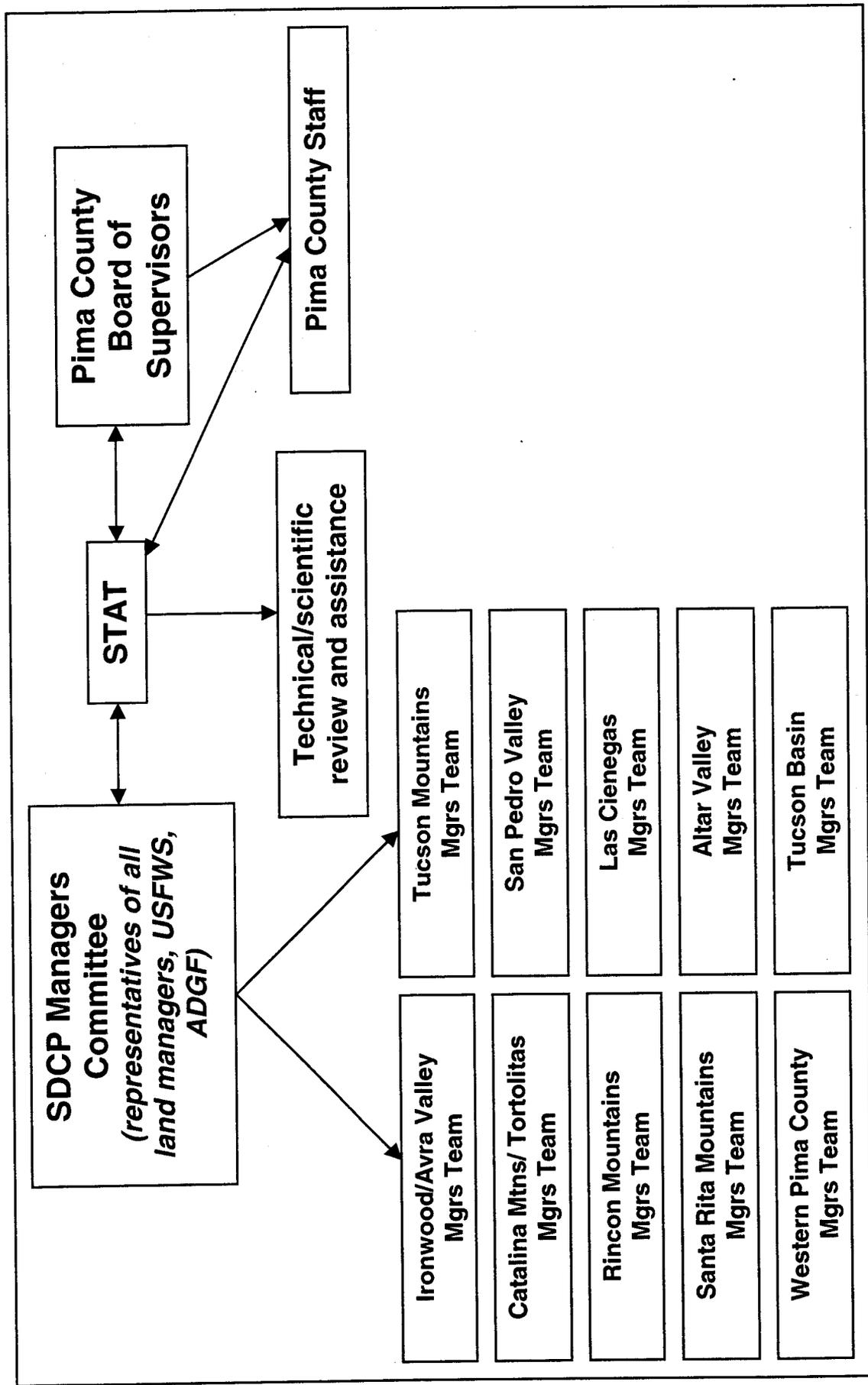
The STAT, with technical/scientific review and assistance and support by County staff, will serve as liaison to the Board of Supervisors, the decision-making body and funding entity.

The AMP must, by its very nature, be adaptive and reflect issues of concern to the Implementation Team and STAT and assist them in answering management-related questions. The Implementation Team will elaborate specifics of the conservation goals and priorities and recommend funding to undertake specific tasks to assist in reaching those goals, employing state-of-the-art scientific methods. An annual or biennial work plan for the AMP will be developed in cooperation and coordination with the Implementation Team and, if approved, will be recommended for approval by the USFWS and adoption by the Board of Supervisors.

B. Tasks of the Implementation Team

The following tasks are examples of management-oriented activities that the Implementation Team will take on:

- Identify scientific investigations needed to achieve or support the goals of the MSHCP.
- Identify needed supporting scientific investigations which must precede each project and insure each project is designed as a valid scientific experiment.
- Develop short-term (<2 years) inventory and survey work plans designed to fill the most immediate data gaps and information needs.



Conceptual Framework for AMP Implementation

Figure 3

- Develop longer-term (>2 years) monitoring work plans specifying measurable standards and milestones explicitly linked to the species and habitat-based goals and objectives established for the covered species.
- Establish detailed monitoring protocols.
- Develop research projects with specific hypotheses, objectives, experimental controls, protocols, evaluation and analysis methods, and data collection and management processes.
- Develop a schedule, detailed list, and cost estimate of projects for the first period and subsequent periods.

C. Discussion of Management Issues and Concern within Existing Reserves

Management and conservation measures, general issues of concern, and potential responses or opportunities will serve as the basis for developing specific tasks under the AMP. Such information has been summarized from the "Reserve Fact Sheets," prior research, and interviews with agency managers and is shown in Appendix D. It is organized by Reserve Management Area, listing the existing reserves within each area with comments on factors affecting conservation.

The information will be updated and described in greater detail after the species and habitat goals are developed, in order to form the initial list of management prescriptions. In the process, we will gain a greater understanding of the management concerns that are currently being addressed, how and to what level, and which ones need attention. It will also be expanded in concert with the ongoing development of a management and conservation strategy geared specifically to the Ranch Conservation Element of the SDCP.

This process will identify:

- Specific management strategies that can be implemented;
- Additional conservation measures that should be considered by each of the land managers and Pima County;
- Specific inventory, monitoring, and research efforts that could be undertaken to serve as a benchmark for measuring change over time (i.e., population counts, quality of habitat, adjacent land uses);
- Plans for change over time (i.e., staffing, funding, phased management, and implementation plans);
- Ways to achieve biodiversity goal(s) by making necessary management changes.

V. Discussion of AMP Elements to Implement the MSHCP

The adaptive management process is the most important contribution of the MSHCP. The development and implementation of the AMP is dependent upon appropriate and directed inventory, monitoring, and research activities. Through implementation of the AMP in cooperation with land managers and resource agencies, the MSHCP provides the opportunity to prioritize and address conservation issues that affect all ecosystems, biological communities, and species throughout Pima County. The AMP will respond particularly to the potential threats and stressors represented by the following examples:

- Uncertainties in species distribution
- Unknown population trends
- Decline in riparian and xeroriparian ecosystems quality and quantity due to changes in water availability (quantity, quality, seasonality) resulting from groundwater pumping and water diversion
- Habitat modification and degradation and population declines in aquatic species resulting from the introduction and establishment of non-native aquatic species
- Habitat loss, degradation, and modification due to urbanization and extension of urban fringe into outlying areas
- Increased long-term recreation demand in natural areas from human population increases
- Habitat degradation and modification and indirect effects on species due to dispersed recreational activities, wildcat trails and roads, and trail construction and maintenance
- Habitat modification and degradation and wildlife mortality from off-road vehicle activities
- Habitat degradation and modification resulting from concentrated recreation
- Habitat degradation and modification due to historic fire suppression and fuels management
- Vegetation community conversion to fire regime due to introduction and spread of exotic grasses and other plant species
- Disruption of species movement patterns and reproduction due to presence of feral dogs and pigs and domestic pets
- Reduction of wildlife populations through roadway mortality
- Reduction of plant, reptile, and amphibian populations by illegal collecting
- Degradation of cave habitats

A. Inventory, Monitoring, and Research

As discussed earlier and described by Figure 1, the adaptive management strategy must be structured such that management actions can be designed and adjusted according to new knowledge gained. According to the USFWS, the strategy should:

- “. . . identify uncertainty and the questions that need to be addressed to resolve the uncertainty;
- develop alternative strategies and determine which experimental strategies to implement;
- integrate a monitoring program that is able to detect the necessary information for strategy evaluation; and
- incorporate feedback loops that link implementation and monitoring to a decision-making process . . .” (U.S. Department of the Interior 2000)

Key elements to establishing an effective strategy include inventory, monitoring, and research.

1. Inventory

Inventory and data gathering are critical to address and reduce uncertainty. Specific data gaps will continue to be identified and included in a work plan addressing inventory needs. Examples of inventory efforts include:

- *Field inventories and surveys*—STAT will identify initial data gaps in species distribution, habitat preferences, threats, and populations; and data gaps that are identified as obstacles to the achievement of management objectives (e.g., depth to groundwater, stream flows, presence of stock tanks, presence/absence of non-native species).
- *Information needed for research efforts*—Research projects will identify raw data needed to test hypotheses.
- *Continued additions to species accounts*—Much of this will be accomplished by completion of documents within the next few months. Additional information will be added as it becomes available through further surveys and studies.
- *Continued improvements to GIS data base*—RECON is currently preparing a comprehensive update to the land cover data base and species distribution mapping. Cost and fiscal impact layers will soon be added. As additional studies provide more info, that will be added.
- *Data base for inventory data*—There will be a need to develop and maintain a digital data base for inventory projects and data collected, as well as ways to cooperate with other participants in establishing and maintaining a repository for digital biological data covering Pima County. Some portions may need to be access restricted.

2. Monitoring

Adaptive management requires constant assessment of the effectiveness of management actions. That assessment occurs through monitoring. Monitoring not only serves to ensure compliance with Endangered Species Act requirements, it also reduces uncertainty of assumptions. It will include both compliance monitoring (verifying that the signatories of the plan are carrying out the terms of the MSHCP) and effectiveness monitoring (tracking the effects of the permitted action and whether the effectiveness of the MSHCP is consistent with the assumptions and predictions made when the MSHCP was approved).

The USFWS requires that the scope of the monitoring program be commensurate with the scope and duration of the conservation program and the biological significance of its effects. The monitoring program measures progress toward meeting the biological goals and objectives that are identified for species, their habitats, and ecosystems. Monitoring efforts will include efforts such as:

- *Accounting of incidental take*—This will track take that occurs as a consequence of permitted activities.
- *Species status*—This will track changes in distribution, population trends, reproductive rates, density, and other factors.

- *Habitat condition*—This will identify changes, whether positive or negative, in field conditions (e.g., a program to monitor riparian and aquatic systems function and habitat condition, including stock ponds; a program to assess recreation trends and effects on the Priority Vulnerable Species and ecological resources; a plan to inventory and map problem areas of non-native species and monitor encroachment over time).
- *Program progress*—We will need to report on specifics such as number of acres of habitat restored or acquired for certain species.
- *Data base for monitoring efforts*—There is a need to develop and maintain a data base to track the wide range of monitoring programs that are ongoing and proposed, not only to avoid redundancies but also to provide a way of informing managers of the work going on and to share the results. Some portions may need to be access restricted.

Monitoring priorities may need to be evaluated on an annual basis in order to coordinate the development of additional monitoring efforts and protocols for species and habitats. The results of the monitoring activities will be used to refine management strategies for protection of the species of concern. Where monitoring has indicated status decline or habitat degradation for the species of concern, strategies will be needed to avert further decline or degradation and improve species status and habitat quality.

3. Research

Research is essential to effective monitoring. It is necessary for the development and correction of the conceptual model of the ecosystem. Assumptions of which management actions will lead to the desired objectives of the MSHCP need to be tested by scientifically defensible research. Research will be employed to test hypotheses that emerge as the species-specific goals and objectives are established. The various research projects will be designed to answer critical questions, thereby reducing uncertainty and enabling refinement of management. Research projects will address topics such as:

- Identification and verification of threats and stressors
- Conceptual models describing key ecosystem interactions
- Identification of indicators of conservation effectiveness
- Direct responses to management issues and concerns
- Sampling designs to estimate status and trends of indicators
- Threshold values that will trigger management changes
- Identification of management actions that will prevent unlisted species from being listed as threatened or endangered

As with inventory and monitoring, there is a need to develop and maintain a data base to track the wide range of programs that are ongoing and proposed, not only to avoid redundancies but also to provide a way of informing managers of the work going on and to share the results. Knowing what research is under way will be key in designing a meaningful research program. The program will identify, develop, and implement research projects located on public as well as private lands.

Funding for inventory, monitoring, and research efforts will be based on identified priorities of the MSHCP. The Implementation Team will consider funding requests for management actions from federal, state, and other land managers in light of the biological data, analyses, and recommendations produced as a product of the AMP.

B. Protection, Restoration, and Enhancement

For the most part, protection, restoration, and enhancement actions are either ecosystem- or community-specific (e.g., riparian), but there may also be actions proposed that are not tied to either land management area or ecosystems that will be implemented throughout Pima County. Activities for the protection, restoration, or enhancement of Priority Vulnerable Species' habitats may include:

- Design a riparian and wetland restoration program to provide habitat for native fish and frogs and combat non-native invasive species.
- Protect sensitive areas by closing roads or trails or by increasing monitoring and supervision of visitor use.
- Design revegetation projects to restore habitat in heavily used areas.
- Work with ranchers and agencies on watershed improvement projects.
- Identify opportunities for restoration of abandoned agricultural lands.
- Develop a cooperative plan to remove feral pigs and dogs.
- Identify changes in grazing management or structures necessary to implement grazing system changes to allow range recovery and protection of riparian areas.
- Identify soil erosion projects and install erosion control structures.
- In some areas, purchase water rights or development rights in order to protect the long-term viability of ecosystems (e.g., riparian and wetland areas, areas of shallow groundwater).
- Increase staffing to better field-monitor visitor use, illegal collection, and changes in resource condition.
- Insure clearance of maintenance and construction activities conducted in undisturbed habitat prior to disturbance. Salvage native plants where possible and utilize in restoration efforts.
- Design restoration projects to focus on protection and enhancement of the species of concern and do not inadvertently cause damage to the habitats of Priority Vulnerable Species.

C. Public Information and Education

Public information and education is a key component needed to support management measures of the AMP. Through this program and in cooperation with land managers and other conservation organizations, the MSHCP provides the opportunity to address conservation issues that affect all ecosystems, biological communities, and species throughout Pima County. Programs and information should be designed to respond to threats and stressors of Priority Vulnerable Species and may include brochures, interpretative signs, workshops, presentations, field volunteers, training courses, exhibits, and, of course, the website that continues to be developed by Pima County.

The program should be designed to address at least these three general objectives:

1. Inform the public of the terms of the Section 1(a) permit.
2. Encourage respect, protection, and enjoyment of natural ecosystems in Pima County.
3. Through education and public participation, increase public understanding and awareness of the value of Pima County's biological diversity and natural ecosystems.

Consideration should be given to:

- Use all opportunities where the public is contacted to distribute materials emphasizing biodiversity protection and ecosystem management.
- Ensure that educational materials are focused on critical issues such as closing gates, staying on trails, controlling pets, avoiding trampling of vegetation or harassment of wildlife.
- Design individual programs to highlight biodiversity and sensitive ecological resources such as riparian systems.
- Design materials such that they are suitable and available for use by various agencies and groups.
- Direct information as specific user groups such as cavers, mountain bikers, equestrians, and off-road vehicle users.
- Install signage at critical locations to provide information on low-impact recreation and ecological resource protection.
- Evaluate current permitting practices, particularly in sensitive areas.
- Engage the support of the community through volunteer monitoring, restoration, and cleanup projects identified by the AMP.

D. Land Use Policies and Actions

Land use policies must be developed or revised to support the AMP and the MSHCP as a whole. Currently the County's General Land Use Plan is undergoing a major amendment in order to meet the requirements of the State's Growing Smarter legislation. At the same time it will be tailored to provide support and protection of the reserve design as it is developed and to facilitate the implementation of the AMP. As adopted in September 2000, the preliminary SDCP calls for significant modification of land use planning and zoning codes including the following that directly affect biological resources:

- Deferring Conditional Use Permits in sensitive areas
- Developing an Environmentally Sensitive Lands Ordinance
- Amending the Native Plant Preservation Ordinance
- Amending the Buffer Overlay Zone and Golf Course Overlay Zone
- Expanding water conservation requirements for new development

Additionally the County is proposing a legislative agenda that would affect state laws as needed to better manage community growth and avoid long-term adverse biological impacts. In this are proposals that would address the habitat fragmentation that results from unregulated subdivisions, create tax incentives for private conservation easements, and fund open space acquisition and conservation activities.

Funding strategies proposed by the County for implementation of the SDCP include transportation impact fees, sewer impact fees supporting water conservation, open space bonds, mitigation payments for rezoned critical habitat, and major development endowment funds.

Examples of land use policies and actions that could be developed by participating agencies include:

- Update or prepare management plans that support the MSHCP and AMP, specifically for consistency with the forthcoming species and habitat goals for Priority Vulnerable Species.

- Establish a protocol for regular review of management plans to be revised as appropriate in response to new findings from inventory, monitoring, and research efforts.
- Evaluate current and proposed land uses in this context.
- Limit negative effects to Priority Vulnerable Species due to visitor use, management activities, construction, and expansion of facilities.
- Reconsider policies and need for actions in addressing non-native invasive species.
- Assess land disposal plans in the context of the SDCP Reserve Design when it is developed.
- Focus new recreation activities and use areas into less sensitive areas as defined by the SDCP habitat suitability analysis. Consider mineral resource extraction activities in the same context.
- Evaluate permitting policies for recreational use, utility siting, and specimen collecting.
- Review or establish policies for roads, camping, and parking to best protect riparian, wetland, and other sensitive ecosystems.
- Review or establish landscape restoration policies for revegetation and enhancement of biological communities.
- Participate in the development and implementation of a county-wide fire ecology study and program.

VI. Summary and Conclusions

A. Summary of Functions of the Pima County MSHCP AMP

To summarize, the intent and purpose of the AMP will to accomplish the following objectives:

- Provide a forum for coordinated and integrated management of biological resources on a regional scale—seamless management to the extent feasible.
- Provide mechanism for most efficient allocation of resources across the landscape (including more than funding, possibly sharing of personnel for policing of areas and activities in open spaces).
- Provide a potential resource for assistance in addressing scientific issues in implementing the AMP (appropriate research design and data evaluation in a regional context).
- Establish a clearinghouse for the assembly and exchange of regional scientific information (e.g., GIS data layers, biological inventory, monitoring and research data).
- Provide a viable regional plan that can function to attract and distribute federal funding that might not be available on a more “piecemeal” plan basis.
- Assist in meeting Section 7 obligations in the context of a larger picture—the regional framework.
- Assist in meeting mitigation obligations in the context of a larger picture—the regional framework (e.g., one agency may be looking for a mitigation banking location that meets the habitat needs of their projects in another parts of the state or county).

B. Adaptive Management Decision Making

The AMP will incorporate further input from managers regarding stressors, management actions being considered for modifications, and methods that can be used to minimize economic impacts while still meeting goals. It will inform the Implementation Team of the biological factors to be considered as they make ongoing funding decisions.

Biological recommendations emanating from the AMP for inventory, monitoring, and research will be used by the Implementation Team to establish priorities, taking into consideration available funding, socioeconomic factors, human impacts, political realities, agency mandates, and the MSHCP goals and objectives. Reports and information generated by the AMP will be available to decision makers and managers alike and will be constantly factored back into the process of establishing management actions and reevaluating the goals and assumptions of the MSHCP.

C. Conclusion

As discussed earlier, this document is intended to initiate a dialogue on adaptive management and to broadly identify existing management practices and issues. The next step will be for each of the existing reserve managers to review the finalized species and habitat goals, along with the habitat suitability maps, when they are available. It will be in this context that they will further identify management and conservation actions they propose to support the MSHCP. Specific management protocols and detailed implementation strategies will be developed. This will be the basis of the implementation plan.

RECON will continue to coordinate with the STAT, County staff, agencies, and reserve managers over the next several months and will prepare a manual for establishing and implementing the Pima County MSHCP AMP by next summer.

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APPENDIXES

APPENDIX A

**APPENDIX A
LIST OF SDCP PRIORITY VULNERABLE SPECIES AND THEIR RESERVE LOCATIONS**

Priority Vulnerable Species	Reserve Locations	Management Plans/Programs/Protective Measures	Habitat Requirements
Mammals			
Mexican long-tongued bat <i>Choeronycteris mexicana</i>	Colossal Cave Mountain Park, Organ Pipe Cactus NM, Coronado National Forest (Nogales and Santa Catalina Districts), Saguaro NP west, Empire-Cienega RCA, Cienega Creek Natural Preserve	CNF requires bat surveys of mines that may be disturbed with construction; informal monitoring program has been conducted at Colossal Cave MP.	Caves and mines, mixed oak-conifer forests surrounded by desert (4000-6000 ft). May occur in low elevation riparian areas and in soil tubes.
Allen's big-eared bat <i>Idionycteris phyllotis</i>	Hypothetical occurrence in SNP east, Colossal Cave MP, Coronado National Forest.	No known recovery plans, mitigation efforts, etc.	Ponderosa pine, pinyon-juniper, and riparian woodlands, as well as desert scrub. Roosts in mine tunnels. Potential habitat includes San Pedro River and northeast side of Santa Catalinas. (2,600-9800 ft)
Western red bat <i>Lasiurus blossevillii</i>	Santa Rita Experimental Range, Empire-Cienega RCA, Coronado National Forest (Santa Catalina district), Colossal Cave Mountain Park. Presence expected at Saguaro National Park.	No known recovery plans, mitigation efforts, etc.	Known only from broadleaf riparian deciduous forests and woodlands. Walnuts, sycamores, and cottonwoods along riparian corridors from 2400-7200 feet. May also occur in yucca.
Southern yellow bat <i>Lasiurus xanthinus (ega)</i>	Ideal situation present at Agua Caliente Park, may be present at Colossal Cave MP. May be present elsewhere.	No known management guidelines, recovery plans, etc.	Dependent on fan palms and riparian deciduous woodland tree species (cottonwood-willow).
Lesser long-nosed bat <i>Leptonycteris curasoae yerbabuena</i>	Roost sites found in Cabeza Prieta NWR, Organ Pipe Cactus NM, Saguaro NP, Coronado National Forest, and Colossal Cave MP.	Has a USFWS mandated recovery plan; current protective measures consist of gating and monitoring several roost sites; several existing monitoring and research programs occurring, included research at the BMGR and at Organ Pipe Cactus NM.	Semidesert grasslands and Sonoran desert scrub, below 3500-5500 ft. Dependent on roost site (inactive mines) and appropriate food plants.

APPENDIX A
LIST OF SDCP PRIORITY VULNERABLE SPECIES AND THEIR RESERVE LOCATIONS

California leaf-nosed bat <i>Macrotus californicus</i>	Cabeza Prieta NWR, Coronado Nation Forest (Nogales district), Organ Pipe Cactus NM, Ironwood National Monument?? Also known to be present in Tucson Mountain Park and Colossal Cave Mountain Park.	Several mines in this species range has been gated. AGFD has an active program of bat research and protection of important roosts. OPCNM has an active bat research program.	Populations in Pima County known from inactive mines.
Merriam's mesquite mouse <i>Peromyscus merriami</i>	One specimen trapped at OPCNM.	No known management guidelines, recovery plans, etc. OPCNM has a long term trapping program for small mammals.	Dependent on mesquite bosques. Small bosques present in OPCNM, Saguaro National Park, Buenos Aires National WR, Empire-Cienega RCA, Coronado National Forest, Cienega Creek NP, and Colossal Cave MP.
Pale Townsend's big-eared bat <i>Plecotus townsendii pallescens</i>	Uses Colossal Cave MP as a maternity roost. Found in Tucson Mountain Park, OPCNM, and Saguaro National Park. Also in Total Wreck Mine on the Empire Cienega RCA. Probably in the Coronado National Forest.	Several mines in this species range has been gated. OPCNM has an active bat research program. The Idaho State Conservation Effort has developed management recommendations for this species.	Known to use caves, mines and buildings through a range of elevations and veg communities.
Arizona shrew <i>arizonae</i>	Species has not been recorded in Pima County.	No known monitoring or research projects for this species.	Known from above 5675 ft. in areas with downed woody debris, near surface water along drainages in mountain canyons. All potential suitable habitat is in National Forest or Park boundaries.

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LIST OF SDCP PRIORITY VULNERABLE SPECIES AND THEIR RESERVE LOCATIONS

Birds			
Rufous-winged sparrow <i>Aimophila carpalis</i>	Saguaro National Park east, Buenos Aires NWR, Empire-Cienega RCA, and Coronado National Forest (Santa Catalina district)	Arizona Partners in Flight is developing a conservation plan for all of AZ's breeding, winter and resident birds. Species is protected under the Migratory Bird Treaty Act.	Requires flat or gently rolling hilly desert grasslands, with scattered shrubs or trees and grass of various species. Seeds and arthropods for food.
Burrowing owl <i>Athene cucularia hypugaea</i>	Has been recorded in Coronado National Forest. Listed as a rare transient in Buenos Aires NWR and Saguaro National Park.	Species is protected under the Migratory Bird Treaty Act. AZ Breeding Bird Atlas records locations of breeding birds in AZ. Current monitoring of all birds is occurring in several reserves, no species specific monitoring in known.	Inhabit open areas such as grasslands, pastures, desert scrub, and the edges of agricultural fields. Golf courses, airports, cemeteries, vacant lots, and road embankments, wherever there is friable soil for a nesting burrow.
Swainson's hawk <i>Buteo swainsoni</i>	Breeding pairs have been confirmed on the Buenos Aires NWR.	AZ Breeding Bird Atlas records locations of breeding birds in AZ. USFS is working with Argentina's Institute of Agricultural Technology to find solutions with pesticides and wildlife in the pampas.	Nest in grasslands, semidesert grasslands, and savanna grasslands, mixed with desert scrub. Forage exclusively on open plains and grasslands where visibility is good.
Western yellow-billed cuckoo <i>Coccyzus americanus ssp. occidentalis</i>	Empire-Cienega RCA, BANWR, Saguaro National Park (listed as rare transient), Coronado National Forest (Santa Catalina district--listed as rare transient in riparian habitat).	Species is protected under the Migratory Bird Treaty Act. AZ Breeding Bird Atlas records locations of breeding birds in AZ. AGFD is involved in monitoring and research. Petitioned for listing as endangered.	Have been recorded in mature Sonoran Riparian Deciduous Forest, cottonwood-willow series, and Sonoran riparian scrub in well developed mesquite bosques and pecan orchards.

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Southwestern willow flycatcher <i>Empidonax traillii extimus</i>	No HDMS records of this species exist for Pima County. May be a rare migrant-potentially suitable conditions for this species may be present or develop at Empire-Cienega RCA, Buenos Aires NWR. Occasional sight records are reported along the Santa Cruz River. This species has occurred at Bingham Cienega NP.	A federal recovery plan is in development. Coordinated surveys and research studies have been done since 1993 by USFWS, AGFD, and private consultants.	Riparian vegetation for nesting-- includes tamarisk dominated stands.
Cactus ferruginous pygmy-owl <i>Glaucidium brasilianum cactorum</i>	Organ Pipe Cactus National Monument, Buenos Aires NWR	A federal recovery plan is in development. Coordinated surveys and research studies have been done since 1993 by USFWS, AGFD, and private consultants. Critical Habitat has been designated.	Not enough is known about particular habitat requirements. Historically used riparian habitats--now found in thick desert scrub.
Abert's towhee <i>Pipilo aberti</i>	Known from Saguaro National Park, OPCNM, BANWR, Empire-Cienega RCA, Coronado National Forest, the Santa Cruz River Park, Tucson Mountain Park, Cienega Creek NP, and Agua Caliente Park.	This species is protected under the Migratory Bird Treaty Act, despite its sedentary trait. Also included in the annual Christmas Count. Removal of cows from the San Pedro Riparian Conservation Area doubled the population of this species.	Prefers Sonoran riparian deciduous woodland and riparian scrubland, with a dense understory of shrubs.
Bell's vireo <i>Vireo bellii</i>	Occurs in Saguaro National Park, OPCNM, BANWR, Tucson Mountain Park, Cienega Creek NP, Colossal Cave MP	This species is protected by the Migratory Bird Treaty Act. Habitat is included in a study of the effluent-dominated portion of the Santa Cruz River, and also included in the Christmas Count. Monitoring studies done by OPCNM.	Prefers dense, low, shrubby vegetation in riparian areas.
Reptiles			
Tucson shovel-nosed snake <i>Chionactis occipitalis klauberi</i>	Found in OPCNM, Saguaro National Park	OPCNM has long-term monitoring for all vertebrates species, but snakes are not consistently reported on.	Occurs on open, sandy sites and is present on riparian scrub, creosotebush, and Sonoran desert scrub.

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Organ Pipe shovel-nosed snake <i>Chionactis palarostris organica</i>	Organ Pipe Cactus National Monument	OPCNM has long-term monitoring for all vertebrates species, but snakes are not consistently reported on.	Found in a limited portion of Palo verde-Mixed cacti scrub series, on more rocky soils on bajadas and valley bottoms.
Giant spotted whiptail <i>Cnemidophorus burti stictogrammus</i>	Coronado National Forest (Sabino Canyon Recreation Area). Has been recorded in the Baboquivari and Santa Rita Mountain Ranges.	No known monitoring and research projects for this species.	Found in the lower Sonoran and upper Sonoran life zones in mountain canyons, arroyos, and mesas, and along stream courses. Near sea level to 4500 feet.
Red-backed whiptail <i>Cnemidophorus burti xanthonotus</i>	Organ Pipe Cactus National Monument	OPCNM has long-term monitoring for all vertebrates species, this species is rarely found.	Includes juniper-oak woodland down to the desert edge, among dense shrubby vegetation near and on the banks of semi-arid permanent springs and arroyos, and in canyons. Elevations range from 2000-4000 feet.
Ground snake (valley form) <i>Sonora semiannulata</i>	Coronado National Forest and Saguaro National Park. 1 record from OPCNM	No known monitoring and research projects for this species.	grassland islands within mountain seas. Occupies plains, valley, and foothill habitats.
Desert box turtle <i>Terrapene ornata luteola</i>	Empire-Cienega RCA, Coronado National Forest, Buenos Aires NWR	State law prohibits commercial collection. No known monitoring and research projects for this species.	Inhabits arid and semi-arid treeless plains and rolling grass and shrub land.
Mexican garter snake <i>Thamnophis eques megalops</i>	Cienega Creek NP?, Empire-Cienega RCA,	No specific monitoring and research programs are known.	Cienegas within desert grassland to elevations of 8500. Habitat occasionally includes desert and lower oak woodland habitats.

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Amphibians			
Chiricahua leopard frog <i>Rana chiricahuensis</i>	Coronado National Forest (Nogales district), Buenos Aires NWR	AGFD maintains a program of research and monitoring for all frogs in the state.	Aquatic and riparian species-- rocky streams with deep, rocky pools, overflow pools, and oxbows of rivers, permanent springs, ponds, and wetlands at elevation from 3500 to 8040 feet. Also occurs in stock tanks.
Lowland leopard frog <i>Rana yavapaiensis</i>	Cienega Creek NP, Saguaro National Park east, Coronado National Forest, Buenos Aires NWR, Empire Cienega RCA.	AGFD maintains a program of research and monitoring for all frogs in the state.	Restricted to permanent water sources. Prefers small to medium streams over ponds, stock tanks, and other aquatic habitats.
Fish			
Longfin dace <i>Agosia chrysogaster</i>	Cienega Creek NP, Empire-Cienega RCA, Buehman Canyon	No known monitoring and research projects for this species.	Clear cool mountain brooks at higher elevations, small, intermittent low-desert streams with a sand or gravel substrate.
Desert sucker <i>Catostomus clarki</i>	No record of this species exist in Pima County. No known potential habitat exists for this species in Pima County under current conditions.	No known monitoring and research projects for this species.	Found in rapids and flowing pools of streams, bottoms with gravel-rubble with sandy silt in the interstices.
Sonora sucker <i>Catostomus insignis</i>	No record of this species exist for Pima County.	No known monitoring and research projects for this species.	Requires lentic and pool habitats, with gravel rubble bottoms.
Desert pupfish <i>Cyprinodon macularius macularius</i>	Pima County has no known natural habitat for this species.	A federal recovery plan has been developed for this species. No information is known regarding current monitoring and research programs. Attempts at reintroducing the species is usually not successful.	Requires water but has a high range of tolerances. Needs to be free of non-native species and have an abundance of invertebrate prey species.

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Gila chub <i>Gila intermedia</i>	Coronado National Forest (Sabino Canyon, Redfield Canyon), Empire-Cienega RCA. Potential habitat at Cienega Creek NP.	Habitat restoration projects are ongoing at Empire-Cienega RCA. BLM conducts annual monitoring on populations of Gila chub within their lands.	Usually found in small headwater streams, cienegas and springs, or marshes of the Gila River basin. Affinity for deeper pools in slow moving water with some sort of cover (undercut banks, root wads, etc.)
Gila topminnow <i>Poeciliopsis occidentalis occidentalis</i>	Empire-Cienega RCA	A federal recovery plan has been developed for this species. AGFD, USFWS, and USFS have cooperated in an effort to recover this species by reintroducing it to formerly occupied habitats. AGFD continues a monitoring and reintroduction program.	Restricted to springs, cienegas, permanent and intermittent streams, and margins of large rivers.
Invertebrates			
Arkenstone Cave pseudoscorpion <i>Albiorix anophthalmus</i>	Colossal Cave Mountain Park	Since 1990, an ongoing monitoring program for the fauna of Arkenstone Cave.	Requires pristine, undisturbed cave environment with a healthy population on crickets and psocids.
Talus snails <i>Sonorella</i> species	All recommended taxa fall outside of reserves.	No known monitoring and research projects for these species.	Generally, <i>Sonorella</i> require limestone rocks with cracks or talus formations on northfacing slopes near hilltops or in rocky canyons. There have been

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Plants			
Pima pineapple cactus <i>Coryphantha scheeri</i> var. <i>robutispina</i>	Cienega Creek NP, Coronado National Forest (Nogales District), Buenos Aires NWR	Federal recovery plan not yet available. The ESA protects this species, as well as the AZ Native Plant Law. Monitoring efforts on a small transplanted population is in progress. ASDM is conducted a 4 year study on this species. USFS has been monitoring the CNF pop for the last 4 years, and will continue to be monitored.	Most often found along ridges in semidesert grassland and lower Sonoran Desert scrub alluvial fans from elevations of 2300 to 5000 feet.
Gentry indigo bush <i>Dalea tentaculoides</i>	Not known from Pima County	No known monitoring or research projects for this species.	Found along canyon bottoms on cobble terraces that are subject to occasional flooding.
Nichol's Turk's head cactus <i>Echinocactus horizontalis</i> var <i>nicholii</i>	Ironwood National Monument	A federal recovery plan has been approved. This species is protected by the ESA and the AZ Native Plant Law. Recovery efforts by BLM have included the development of a Habitat Management Plan and establishment of a monitoring plot in the Waterman Mnts. TNC conducted a study of this species in TON lands.	Inhabits talus-strewn limestone slopes in Sonoran Desert Scrub.
Acuna cactus <i>Echinomastus erectocentrus</i> var <i>acunensis</i>	Organ Pipe Cactus National Monument	The population at OPCNM has been monitored annually for growth, reproduction, and mortality since 1988.	Restricted to well-drained knolls and gravel ridges between major washes.
Needle-spined pineapple cactus <i>Echinomastus erectocentrus</i> var <i>erectocentrus</i>	Cienega Creek NP, Colossal Cave MP	AZ Native Plant Law protects this species as Salvage Restricted. An informal study of this species is underway at Colossal Cave MP.	Found on alluvial fans and hills on southern and western exposures, from 3000 to 4600 feet.

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<p>Huachuca water umbel <i>Lilaeopsis schaffneriana recurva</i></p>	<p>Empire-Cienega RCA</p>	<p>A federal recovery plan is not yet finalized. Critical Habitat has been designated by USFWS. Protected under the ESA. A monitoring program is continuing on the San Pedro Riparian Conservation Area.</p>	<p>Requires perennial water, gentle stream gradients, small-to medium sized drainage areas, and mild winters.</p>
<p>Tumamoc globeberry <i>Tumamoca macdougalii</i></p>	<p>Organ Pipe Cactus National Monument, Tucson MP, Saguaro National Park, Coronado National Forest (Sabino Canyon), BOR Wildlife Corridor and Tumamoc Reserves (which may not necessarily occur in the BOR Wildlife Corridor).</p>	<p>Protected by the AZ Native Plant Law as Salvage Restricted. Long term monitoring studies have been done on pops that received some form of mitigation treatments. Continued monitoring is occurring for some pops by USFWS, and by USFS.</p>	<p>Species appears dependent on a nurse plant, such as ironwood, mesquite, palo verde, creosote bush</p>

APPENDIX B

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LIST OF RESERVES AND PRIORITY VULNERABLE SPECIES

This chart has been compiled from the document, *Priority Vulnerable Species*. The species location information has been based on documented species occurrence in the various reserves. Species absence from reserves may indicate lack of information or lack of species-specific surveys. The mountain lion, desert tortoise, kit fox, bighorn sheep, and sacaton grass are not considered by the STAT (Science and Technical Advisory Team for the Sonoran Desert Conservation Plan) as Priority Vulnerable Species, but are under consideration as potential umbrella and modeling species.

Reserve	Priority Vulnerable Species
Baboquivari Wilderness	Unknown
Bingham Cienega Natural Preserve	Lowland leopard frog <i>Rana yavapaiensis</i>
Buenos Aires NWR	Rufous-winged sparrow <i>Aimophila carpalis</i>
	Burrowing owl <i>Athene cunicularia hypugaea</i>
	Swainson's hawk <i>Buteo swainsoni</i>
	Cactus ferruginous pygmy-owl <i>Glaucidium brasilianum cactorum</i>
	Abert's towhee <i>Pipilo aberti</i>
	Bell's vireo <i>Vireo bellii</i>
	Western yellow-billed cuckoo <i>Coccyzus americanus occidentalis</i>
	Desert box turtle <i>Terrapene ornata luteola</i>
	Chiricahua leopard frog <i>Rana chiricahuensis</i>
	Lowland leopard frog <i>Rana yavapaiensis</i>
	Pima pineapple cactus <i>Coryphantha scheeri</i> var. <i>robustispina</i>
	Mountain lion <i>Felis concolor</i>
	Desert tortoise <i>Gopherus agassizi</i>
	Kit fox <i>Vulpes macrotis</i>
	Butterfly RNA

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Cabeza Prieta NWR	Lesser long-nosed bat <i>Leptonycteris curasoae yerbanbuena</i>
	California leaf-nosed bat <i>Macrotus californicus</i>
	Pale Townsend's big-eared bat <i>Plecotus townsendii pallescens</i>
	Ground snake (valley form) <i>Sonora semiannulata</i>
	Mountain lion <i>Felis concolor</i>
	Kit fox <i>Vulpes macrotis macrotis</i>
	Bighorn sheep <i>Ovis canadensis mexicana</i>
	Cactus ferruginous pygmy-owl <i>Glaucidium brasilianum cactorum</i>
	Red-backed whiptail <i>Cnemidophorus burti xanthonotus</i>
	Burrowing owl <i>Athene cunicularia</i>
	Bell's vireo <i>Vireo bellii</i>
	Southwestern willow flycatcher <i>Empidonax traillii extimus</i>
	Desert tortoise <i>Gopherus agassizi</i>
Catalina State Park	similar (same?) to Coronado National Forest list
Cienega Creek Natural Preserve	Abert's towhee <i>Pipilo aberti</i>
	Merriam's mesquite mouse <i>Peromyscus merriami</i>
	Western red bat <i>Lasiurus blossevillii</i>
	Mexican long-tongued bat <i>Choeronycteris mexicana</i>
	Cactus ferruginous pygmy-owl <i>Glaucidium brasilianum cactorum</i>
	Bell's vireo <i>Vireo bellii</i>
	Mexican garter snake <i>Thamnophis eques megalops</i>

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	Lowland leopard frog <i>Rana yavapaiensis</i>
	Longfin dace <i>Agosia chrysogaster</i>
	Pima pineapple cactus <i>Coryphantha scheeri</i> var. <i>robustispina</i>
	Needle-spined pineapple cactus <i>Echinomastus erectocentrus</i> var. <i>erectocentrus</i>
Colossal Cave	Mexican garter snake <i>Choeronycteris mexicana</i>
	Allen's big-eared bat <i>Idionycteris phyllotis</i>
	Western red bat <i>Lasiurus blossevillii</i>
	Southern yellow bat <i>Lasiurus xanthinus</i>
	Lesser long-nosed bat <i>Leptonycteris curasoae</i> <i>yerbanbuena</i>
	California leaf-nosed bat <i>Macrotus californicus</i>
	Pale Townsend's big-eared bat <i>Plecotus townsendii pallescens</i>
	Bell's vireo <i>Vireo bellii</i>
	Arkenstone Cave pseudoscorpion <i>Albrix anaphthalmus</i>
	Needle-spined pineapple cactus <i>Echinomastus erectocentrus</i> var. <i>erectocentrus</i>
	Desert tortoise <i>Gopherus agassizi</i>
	Mountain lion <i>Felis concolor</i>
	Kit fox <i>Vulpes macrotis</i>
	Mexican long-nosed bat <i>Choeronycteris mexicana</i>
	Allen's big-eared bat <i>Idionycteris phyllotis</i>
	Western red bat <i>Lasiurus blossevillii</i>

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Coronado National Forest	Lesser long-nosed bat <i>Leptonycteris curasoae yerbanbuena</i>
	California leaf-nosed bat <i>Macrotus californicus</i>
	Rufous-winged sparrow <i>Aimophila carpalis</i>
	Burrowing owl <i>Athene cunicularia hypugaea</i>
	Western yellow-billed cuckoo <i>Coccyzus americanus ssp occidentalis</i>
	Abert's towhee <i>Pipilo aberti</i>
	Giant spotted whiptail <i>Cnemidophorus burti stictigrammus</i>
	Ground snake (valley form) <i>Sonora semiannulata</i>
	Desert box turtle <i>Terrapene ornata luteola</i>
	Chiricahua leopard frog <i>Rana chiricahuensis</i>
	Lowland leopard frog <i>Rana yavapaiensis</i>
	Gila chub <i>Gila intermedia</i>
	Pima pineapple cactus <i>Coryphantha scheeri var. robustispina</i>
	Tumamoc globeberry <i>Tumamoca macdougalii</i>
	Coyote Mtn. Wilderness
	Mexican long-tongued bat <i>Choeronycteris mexicana</i>
	Western red bat <i>Lasiurus blossevillii</i>
	Rufous-winged sparrow <i>Aimophila carpalis</i>
	Western yellow-billed cuckoo <i>Coccyzus americanus ssp occidentalis</i>
	Bell's vireo <i>Vireo bellii</i>

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Empire-Cienega RCA	Abert's towhee <i>Pipilo aberti</i>
	Desert box turtle <i>Terrapene ornata luteola</i>
	Mexican garter snake <i>Thamnophis eques megalops</i>
	Lowland leopard frog <i>Rana yavapaiensis</i>
	Longfin dace <i>Agosia chrysogaster</i>
	Gila chub <i>Gila intermedia</i>
	Huachuca water umbel <i>Lilaeopsis schaffneriana recurva</i>
	Same as Empire-Cienega list
Empirita Ranch	Same as Empire-Cienega list
Barry Goldwater Gunnery Range	List may be similar to Cabeza Prieta NWR and Organ Pipe Cactus NM lists.
Ironwood National Monument	Nichol's Turk's head cactus <i>Echinomastus horizonthalonius var. nicholii</i>
	California leaf-nosed bat <i>Macrotus californicus</i>
	Abert's towhee <i>Pipilo aberti</i>
	Pima pineapple cactus <i>Coryphantha scheeri var. robustispina</i>
	Cactus ferruginous pygmy-owl <i>Glaucidium brasilianum cactorum</i>
Mt. Wrightson Wilderness	Unknown
	Mexican long-tongued bat <i>Choeronycteris mexicana</i>
	Lesser long-nosed bat <i>Leptonycteris curasoae yerbanbuena</i>
	California leaf-nosed bat <i>Macrotus californicus</i>
	Merriam's mesquite mouse <i>Peromyscus merriami</i>
	Pale Townsend's big-eared bat <i>Plecotus townsendii pallescens</i>
	Cactus ferruginous pygmy-owl <i>Glaucidium brasilianum cactorum</i>

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Organ Pipe National Monument	Abert's towhee <i>Pipilo aberti</i>
	Bell's vireo <i>Vireo bellii</i>
	Tucson shovel-nosed snake <i>Chionactis occipitalis klauberi</i>
	Organ Pipe shovel-nosed snake <i>Chionactis palarostris organica</i>
	Giant spotted whiptail <i>Cnemidophorus burti stictigrammus</i>
	Ground snake (valley form) <i>Sonora semiannulata</i>
	Acuna cactus <i>Echinomastus erectocentrus</i> var. <i>acunensis</i>
	Tumamoc globeberry <i>Tumamoca macdougallii</i>
	Pusch Ridge Wilderness
Rincon Mtn. Wilderness	<i>Sonorella</i> spp.
Saguaro National Park	Mexican long-tongued bat <i>Choeronycteris mexicana</i>
	Allen's big-eared bat <i>Idionycteris phyllotis</i>
	California leaf-nosed bat <i>Macrotus californicus</i>
	Western red bat <i>Lasiurus blossevillii</i>
	Lesser long-nosed bat <i>Leptonycteris curasoae</i> <i>yerbanbuena</i>
	Pale Townsend's big-eat bat <i>Plecotus townsendii pallescens</i>
	Rufous-winged sparrow <i>Aimophila carpalis</i>
	Burrowing owl <i>Athene cunicularia hypugaea</i>
	Western yellow-billed cuckoo <i>Coccyzus americanus</i> ssp <i>occidentalis</i>
	Abert's towhee <i>Pipilo aberti</i>
	Bell's vireo <i>Vireo bellii</i>

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	Tucson shovel-nosed snake <i>Chionactis occipitalis klauberi</i>
	Lowland leopard frog <i>Rana yavapaiensis</i>
	Giant spotted whiptail <i>Cnemidophorus burti stictigrammus</i>
	Ground snake (valley form) <i>Sonora semiannulata</i>
	Western box turtle <i>Terrapene ornata luteola</i>
	Tumamoc globeberry <i>Tumamoca macdougallii</i>
	Mountain lion <i>Felis concolor</i>
	Kit fox <i>Vulpes macrotis</i>
	Desert tortoise <i>Gopherus agassizi</i>
Santa Catalina RNA	Unknown
Santa Rita Experimental Range	Unknown
The Nature Conservancy (Buehman Canyon)	Abert's towhee <i>Pipilo aberti</i>
	Longfin dace <i>Agosia chrysogaster</i>
Tortolita Mountain Park	Bell's vireo <i>Vireo bellii</i>
	Abert's towhee <i>Pipilo aberti</i>
	Mountain lion <i>Felis concolor</i>
Tucson Mountain Park	California leaf-nosed bat <i>Macrotus californicus</i>
	Mexican long-tongued bat <i>Choeronycteris mexicana</i>
	Pale Townsend's big-eared bat <i>Plecotus townsendii pallescens</i>
	Abert's towhee <i>Pipilo aberti</i>
	Bell's vireo <i>Vireo bellii</i>
	Tumamoc globeberry <i>Tumamoca macdougallii</i>
	Mountain lion <i>Felis concolor</i>

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	Desert tortoise <i>Gopherus agassizi</i>
	Kit fox <i>Vulpes macrotis</i>
Tucson Mitigation Corridor (managed as part of Tucson Mountain Park)	California leaf-nosed bat <i>Macrotus californicus</i>
	Mexican long-tongued bat <i>Choeronycteris mexicana</i>
	Pale Townsend's big-eared bat <i>Plecotus townsendii pallescens</i>
	Abert's towhee <i>Pipilo aberti</i>
	Bell's vireo <i>Vireo bellii</i>
	Tumamoc globeberry <i>Tumamoca macdougalii</i>
	Mountain lion <i>Felis concolor</i>
	Desert tortoise <i>Gopherus agassizi</i>
	Kit fox <i>Vulpes macrotis</i>
Arthur Pack Regional Park (Hardy Wash Corridor)	Cactus ferruginous pygmy-owl <i>Glaucidium brasilianum cactorum</i>
Southeast Regional Park	Pima pineapple cactus <i>Coryphantha scheeri</i> var. <i>robustispina</i>

APPENDIX C

Tucson Mitigation Corridor (Managed as part of Tucson Mountain Park)

Size

- 2,514 acres total in two tracts separated by the Central Arizona Project (CAP) canal. The canal and accompanying right-of way consists of 216 acres.

Ownership/Managing Entity

- The U.S. Department of Interior, Bureau of Reclamation holds title to all 2,730 acres (including title to the Central Arizona Project canal)
- Managed by the Pima County Natural Resources, Parks and Recreation Department.

Reserve Document

- Intergovernmental Agreement: Cooperative Agreement for Use of Project Lands for Wildlife and Plant Conservation and Management, Tucson Mitigation Corridor, Central Arizona Project
- Resolution No. 1989-248: Resolution Calling for the Execution of a Cooperative Agreement for Use of Project Lands for Wildlife and Plant Conservation and Management of the Tucson Mitigation Corridor, Central Arizona Project

Activities Allowed

- Archery hunting
- Research/studies permitted
- Hiking
- Equestrian trails
- Picnicking
- Birding

Known/potential Biological Impact Areas and/or Activities

- Air Traffic
- Utilities
- Proposal by the Public Service Company of New Mexico to construct and operate high-voltage electrical transmission lines through the Tucson Mitigation Corridor.

Priority Vulnerable Species

Mammals-

- Mexican Long-tongued bat(*Choeronycteris mexicana*)-Likely uses food resource in area
- Lesser Long-nosed bat(*Leptonycteris curasoae yerbanbuena*)-May use the area for food resources

- California Leaf-nose bat (*Macrotus californicus*)-Uses the area for food and roost resources
- Merriam's mesquite mouse (*Peromyscus merriam*)-May use food and shelter resources
- Pale Townsend's big-eared bat (*Plecotus townsendii pallescens*) - Likely to use food resources

Birds-

- Rufous winged sparrow (*Aimophia caralis*)-May be found in Tucson Mountain Park
- Swainson's hawk (*Buteo swainson*)-May be found in Tucson Mountain Park
- Cactus ferruginous pygmy owl (*Glaucidium brasilianum cactorum*)-May be found in Tucson Mountain Park
- Abert's towhee (*Pipilo aberti*)-Likely to be found in Tucson Mountain Park
- Bell's vireo (*Vireo bellii*)-Likely to be found in Tucson Mountain Park

Reptiles-

- Tucson Shovel-nosed snake (*Chionactis occipitalis klauberi*)-May be found in Tucson Mountain Park
- Giant spotted whiptail (*Cnemidophorus burti stictogrammus*)-Likely to be found in Tucson Mountain Park
- Ground snake (valley form) (*Sonora semiannulata*)-May be found in Tucson Mountain Park

Plants-

- Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*)-May be found in Tucson Mountain Park
- Gentry indigo bush (*Dalea tentaculoides*)-May be found in Tucson Mountain Park
- Nichol Turk's head cactus (*Echinocactus horizonthalonius* var. *nicholii*)-May be found in Tucson Mountain Park
- Needle-spined pineapple cactus (*Echinomastus erectocentrus* var. *erectocentrus*)-May be found in Tucson Mountain Park
- Tumamoc globeberry (*Tumamoca macdougallii*)-May be found in Tucson Mountain Park

Potentially Problematic Species

The problematic plant species for Tucson Mtn. Park are:

- Lehmann lovegrass (*Eragrostis lehmanniana*)
- Fountain grass (*Pennisetum setaceum*)
- Red brome (*Bromus ruens*)
- Bermuda grass (*Cynodon dactylon*)
- Mouse barley (*Hordeum murinum*)
- Buffelgrass (*Pennisetum ciliare*)

The problematic animal species for Tucson Mtn. Park are:

- European starling (*Sturnus vulgaris*)

Baseline Information

- *Detailed Vegetation Map:* No
- *Plant Inventory:* No
- *Animal Inventory:* No
- *Water Inventory:* The area contains no naturally occurring water sources. There are two wildlife drinkers maintained by Pima County Natural Resources, Parks, and Recreation Department.

GAP Status

- Status 1a

The Tucson Mitigation Corridor is managed to prohibit future developments within the area, other than existing or future wildlife improvements. Management activities of the CAP right-of-way are not included as part of the Mitigation Corridor and may include the maintenance of dikes and cross-drainages, use of borrow materials, and trail building. Five siphons were located along the canal to facilitate movement of wildlife through existing washes. A recreation trail is planned on the CAP right-of-way.

Acquisitions since 1/99

- None

Management

Management goals of the Tucson Mitigation Corridor include: 1) to compensate for wildlife movement disruptions caused by aqueduct construction by providing an undeveloped wildlife movement corridor; 2) to preserve areas containing the Tumamoc globeberry, the night-blooming cereus, Thornber's fishhook cactus, desert tortoise, and Gila monster as compensation for populations impacted by project construction; 3) and to compensate for wildlife habitat lost due to aqueduct construction by prohibiting deleterious activities within the area boundaries.

The management plan for the Mitigation Corridor prohibits several categories of activities:

- any future developments within the area other than existing wildlife habitat improvements, or future improvements, management, or developments agreed to by Reclamation, Arizona Game and Fish Department, U.S. Fish and Wildlife Service, and Pima County;
- grazing, mining, dumping, discharge of firearms, trapping, recreation developments, and off-road vehicles to maintain the integrity of the area for both wildlife and special status plant species;

Pima County Parks and Recreation will maintain and repair two wildlife watering sites with the Tucson Mitigation Corridor (TMC), post and maintain signs around the TMC, ensure trash is kept out of the TMC, maintain and repair the 4 strand fences on the perimeter of the TMC,

maintain locked gates to exclude off-road vehicles, and to enforce all laws and regulations set forth in the management plan, and by the State of Arizona, for the entire 2,730 acres.

Any future improvements, developments, or changes in management must be agreed to by the Bureau of Reclamation, Arizona Game and Fish Department, U.S. Fish and Wildlife, and Pima County Natural Resources, Parks and Recreation Department.

Problems with attaining the management goals include the proposed Arizona Department of Transportation extension of San Joaquin Road along the gas pipeline road which extends through the middle of the TMC. Historically, the gas pipeline route has been used as a shortcut by local residents. This proposed road will have severe negative impacts to wildlife movements through the corridor, and will thereby negate one to the primary management goals. Alternative routes have been identified and discussed with the Pima County Department of Transportation. The TMC will also be negatively impacted by the construction and operation of high-voltage electrical transmission lines through the corridor by the Public Service Company of New Mexico (PNM), should that proposal be approved. Negative environmental impacts include those to wildlife and plant species, to the viewsheds of the most prominent tourist attractions in southern Arizona including Gate's Pass and the Arizona-Sonora Desert Museum, to the Tucson Mountain West Biological Corridor proposed to connect Saguaro National Park and Tucson Mountain Park with the new Ironwood National Monument, and to the new multi-use trail to be located within the CAP right-of-way.

Research

The University of Arizona School of Renewable Natural Resources conducted a study for the Bureau of Reclamation to study movement corridors for large mammals along the aqueduct. The results of the study found that deer crossed the aqueduct within the TMC more often than outside the TMC. Forage, topography, water availability, and proximity to mountains around the TMC and surrounding area represent good habitat for mule deer. Human development around the Mitigation Corridor may reduce its effectiveness. Collared peccaries were also found to use the crossing in the Mitigation Corridor more often than outside the TMC. Coyotes were found to use the TMC crossings less than outside the TMC, yet used all the crossing more often than the mule deer and peccaries. Other tracks found in the Tucson Mitigation Corridor crossings include gray fox (*Urocyon cinereoargenteus*), mountain lion, bobcat, desert cottontail (*Sylvilagus audubonii*), skunks (*Mephitis* spp.) and ringtail cats (*Bassariscus astutus*). Human development around the Mitigation Corridor may reduce its effectiveness.

Bureau of Reclamation has issued a grant to the University of Arizona to investigate the status of mountain lions in the Tucson Mountain. This study may also look at lion movements in and around the Tucson Mountains.

References

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Davis-Monthan Air Force Base

Size

- Unknown

Ownership/Managing Entity

- Davis Monthan Air Force Base is owned and operated by the U.S. Department of Defense.

Reserve Document

- Unknown

Activities Allowed

- Unknown

Known/Potential Biological Impact Areas and/or Activities

- Unknown

Priority Vulnerable Species

- Burrowing owl (*Athene cunicularia hypugaea*)

Potentially Problematic Species

- Unknown

Baseline Information

- *Detailed Vegetation Map:* ?
- *Flora/Fauna Inventory:* ?
- *Water Inventory:* ?

GAP Status

- Unknown

Management

- Unknown

Monitoring

- Unknown

Research

- Unknown

**Barry M. Goldwater Range
(South Tactical Range)**

BMGR Mission: " Provide decisive management of one of the finest air-to-air and air-to-ground tactical aviation range complexes and airspace structures in the world, through a comprehensive mastery of our facilities, airspace and contracts, while incorporating a dedicated stewardship of the environment and natural and cultural resources entrusted to our care." Mission statement of the 56th Range Management Office-BMGR website <www.luke.af.mil>

Size

- 1,650,200 acres
- Total in Pima County: 44,279 acres

Reserve Document

- Military Lands Withdrawal Act of 1999, also known as Title XXX of Public Law 106-65.

Activities Allowed

- Military activities

Priority Vulnerable Species

- Bell's vireo
- Abert's towhee
- Burrowing owl
- Southwestern willow flycatcher
- Desert tortoise
- Bighorn sheep
- Kit fox
- Mountain lion
- California leaf-nosed bat
- Lesser long-nosed bat
- Mexican long-tongued bat

Potential Problematic Species

- Sahara mustard (*Brassica tournefortii*)
- Buffelgrass (*Penestum ciliare*)

Baseline Information

- *Detailed Vegetation Map:* Proposed for 2001
- *Flora and Fauna Inventory:* For selected species: bats, owls, desert tortoise, Acuna cactus
- *Water Inventory:* In progress

GAP Status

- Status 3b

The BMGR in Pima County is part of the South Tactical Range (S-Tac). Military activities in this area include air-to-ground firing (bombing), which is considered detrimental for maintaining the natural integrity in the area. The S-Tac Range is closed to the public to protect public safety and prevent interference with military operations.

Management

The Barry M. Goldwater Range is withdrawn from all forms of appropriation under the general land laws, including the mining laws and mineral and geothermal leasing laws, and jurisdiction of these lands is transferred to the Secretary of the Navy and the Secretary of the Air Force.

The lands withdrawn are reserved for a) an armanent and high-hazard testing area; b) training for aerial gunnery, rocketry, electronic warfare, and tactical maneuvering and air support; c) equipment and tactics development and testing; and d) other defense-related purposes (MLWA 1999).

Natural Resources

The natural resources of the range are managed under the BLM's Lower Gila South Resource Management Plan, Goldwater Amendment. MLWA dictated that the range prepare an integrated natural resources management plan. The draft for this plan is due out in April/May of 2001.

Monitoring

Sonoran pronghorn locations are surveyed daily. Locations, if noted on BMGR are reported to the base mission center. A 3 kilometer buffer is applied to pronghorn locations, and buffered areas are closed to military manuevers. Pronghorn locations spotted near high explosive targets are given a 5 kilometer buffer (pers. communication w/ Robert Berry).

Extensive surveying has been done for the cactus ferruginous pygmy owl. To date, pygmy owls have not been found on the BMGR (pers comm Robert Berry). Extensive surveys for the lesser long-nosed bat have also been conducted . It has not been determined that the bat uses the BMGR significantly.

References

Berry, Robert. Wildlife Biologist. Luke Air Force Base, Environmental Flight, 56th RMO. Personal communication: October 2, 2000.

Military Lands Withdrawal Act of 1999. Act of Congress. Available 10/2/00 on website: <<http://www.luke.af.mil/rmo/titlexxx.htm>>

Barry M. Goldwater Range
(other withdrawn land excluding the South Tactical Range)

BMGR Mission: " Provide decisive management of one of the finest air-to-air and air-to-ground tactical aviation range complexes and airspace structures in the world, through a comprehensive mastery of our facilities, airspace and contracts, while incorporating a dedicated stewardship of the environment and natural and cultural resources intrusted to our care." Mission statement of the 56th Range Management Office-BMGR website <www.luke.af.mil>

Size

- Total in Pima County: 10,444 acres

Reserve Document

- Military Lands Withdrawal Act of 1999, also known as Title XXX of Public Law 106-65.

Activities Allowed

- Military activities
- Visitor recreation

Priority Vulnerable Species

- Bell's vireo
- Abert's towhee
- Burrowing owl
- Southwestern willow flycatcher
- Desert tortoise
- Bighorn sheep
- Kit fox
- Mountain lion
- California leaf-nosed bat
- Lesser long-nosed bat
- Mexican long-tongued bat

Potential Problematic Species

- Sahara mustard (*Brassica tournefortii*)
- Buffelgrass (*Penestum ciliare*)

Baseline Information

- *Detailed Vegetation Map:* Proposed for 2001
- *Flora and Fauna Inventory:* For selected species: bats, owls, desert tortoise, Acuna cactus
- *Water Inventory:* In progress

GAP Status

- Status 3b

This land use for this portion of the BMGR strives to be consistent with the requirements of the Military Lands Withdrawal Act and the Sikes Act.

Management (Lower Gila South Resource Management Plan)

The Barry M. Goldwater Range is withdrawn from all forms of appropriation under the general land laws, including the mining laws and mineral and geothermal leasing laws, and jurisdiction of these lands is transferred to the Secretary of the Navy and the Secretary of the Air Force.

The lands withdrawn are reserved for a) an armament and high-hazard testing area; b) training for aerial gunnery, rocketry, electronic warfare, and tactical maneuvering and air support; c) equipment and tactics development and testing; and d) other defense-related purposes (MLWA 1999).

The natural resources of the range are managed under the BLM's Lower Gila South Resource Management Plan, Goldwater Amendment. MLWA dictated that the range prepare an integrated natural resources management plan. The draft for this plan is due out in April/May of 2001.

The USAF is responsible for land management of the BMGR while providing for military use.

Land Use

Objective: To assure land uses will not interfere with current or future military use of the BMGR and are consistent with the objectives of the new natural and cultural resources management plans.

Geological Resources

The BMGR is withdrawn from all mineral entry.

Water Resources

Objective: Manage water resources in a manner to optimize natural resource uses while ensuring that military uses are considered.

Soils

Objective: The USAF will minimize human-induced acceleration of geologic processes and unnecessary damage to land forms and soils.

Botanical Resources

Objective: The USAF will ensure the protection of plant communities and species diversity. The USAF will also comply with federal and state laws and regulations regarding threatened and endangered flora.

Wildlife Resources

Objective: To ensure the protection of wildlife habitats, species diversity and viable populations.

Atmospheric and Visual Resources

Objective: Establish and maintain visual resource conditions on the BMGR through the application of BLM visual resource management principles on authorized activities.

Cultural Resources

Objective: The cultural resources of the BMGR will be protected and managed in accordance with federal laws, regulations and DOD and USAF policies.

Road Network and Vehicle Use

Objective: Develop and maintain a BMGR transportation plan and road system to meet military and other agency management needs, implement off-road vehicle management designations and provide safe public access. The transportation plan will allow for vehicle use on the BMGR consistent with recreation management, natural and cultural resource goals, and the military mission.

Outdoor Recreation Use and Management

Objective: To provide management prescriptions to meet objectives for each SRMA or ERMA.

Wildfire Management

Objective: Suppress non-military caused fires with the lowest acreage loss and in the most cost-effective and efficient manner.

Wild Horses and Burros

Objective: Determine the ownership of the burros. If the burros are wild and free-roaming, develop a capture-and-removal program. If the burros are owned by individuals, fencing and other methods of control would need to be developed.

Monitoring

Sonoran pronghorn locations are surveyed daily. Locations, if noted on BMGR are reported to the base mission center. A 3 kilometer buffer is applied to pronghorn locations, and buffered areas are closed to military maneuvers. Pronghorn locations spotted near high explosive targets are given a 5 kilometer buffer (pers. communication w/ Robert Berry).

Extensive surveying has been done for the cactus ferruginous pygmy owl. To date, pygmy owls have not been found on the BMGR (pers comm Robert Berry). Extensive surveys for the lesser long-nosed bat have also been conducted. It has not been determined that the bat uses the BMGR significantly.

References

Berry, Robert. Wildlife Biologist. Luke Air Force Base, Environmental Flight, 56th RMO. Personal communication: October 2, 2000.

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U.S. Fish and Wildlife Service

Cabeza Prieta National Wildlife Refuge and
Wilderness
Buenos Aires National Wildlife Refuge

Cabeza Prieta National Wildlife Refuge

Size

- 860,010 acres
- Total in Pima County: 429,750 acres

Reserve Documents

Cabeza Prieta NWR

- Executive Order 8038
- Public Land Order 5493

Wilderness Area

- Arizona Desert Wilderness Act, 1990

Activities Allowed

- Artificial wildlife waters
- Bighorn sheep hunting
- Hiking
- Camping
- Public Information

Known/Potential Biological Impact Areas and/or Activities

- The airspace of the entire refuge is part of the Barry M. Goldwater Air Force Range. Potential sources of biological stress include visual and noise disturbance, disturbance to wildlife behavior, wildlife shifting use areas due to military activities, aircraft collisions with wildlife, and impacts caused by live fire and military debris (RECON, March 2000).
- The refuge borders Mexico experiences illegal traffic from Mexico. Vehicles, as well as stock cut fences and make their own paths. Resource damage includes habitat loss and degradation, disturbance of wildlife, increased potential for wildfires, and introduction of non-native species. Large amounts of trash are left behind (RECON, March 2000).

Priority Vulnerable Species

- Sonoran pronghorn (*Antilocapra americana sonoriensis*)
- Lesser long-nosed bat (*Leptonycteris curasoae yerbabuena*)
- California leaf-nosed bat (*Macrotus californicus*)
- Pale Townsend's big-eared bat (*Plecotus townsendii*)
- Burrowing owl (*Athene cunicularia hypugaea*)
- Swainson's hawk (*Buteo swainsoni*)
- Bell's vireo (*Vireo belli*)

- Mountain lion (*Felis concolor*)
- Kit fox (*Vulpes macrotis macrotis*)
- Bighorn (*Ovis canadensis mexicana*)
- Desert tortoise (*Gopherus agassizii*)

Potentially Problematic Pest Species

Although the refuge is in a remote area, non-native species are present. The non-native species are largely confined to roadsides and other disturbed areas. Control efforts are limited; hand pulling when exotics are encountered. A list of non-native species is available in Appendix A of the Pima County report, Issues of Non-indigenous Species in Reserves.

Baseline Information

- *Detailed Vegetation Map:* Yes; available in 1998 Management Plan
- *Flora and Fauna Inventory:* Yes; lists available in 1998 Management Plan
- *Water Inventory:* Watering tanks

GAP Status

Cabeza Prieta NWR and Wilderness

- Status 1b

The refuge and associated wilderness has been placed in status 1b due to military activities that may detract from the quality of the land.

Management (Final Programmatic Environmental Assessment, 1998)

The U.S. Fish and Wildlife Service is in the process of drafting a new Comprehensive Conservation Plan and an Environmental Impact Statement, due out sometime near the end of 2001. The 1998 document is no longer valid or approved and the statements below may not be accurate.

Fire management--no prescribed burns; if fire is discovered usually burns out before suppression can start; if threatening destruction of private property, will be aggressively suppressed.

Cabeza Prieta NWR has 159 miles of 4WD administrative trails, leading to developed waters and other wildlife management purposes.

A 4WD visitor use trail (200' wide corridor) runs through the wilderness.

Cabeza Prieta administrators, maintains and hauls water to 22 developed waters, 17 of which are in the wilderness area.

Airspace over 822,000 acres of the refuge is part of Barry M. Goldwater Range. A

Memorandum of Understanding between the Air Force and the FWS allows for military flights 1,500 feet above ground level. The MOU also allows for the use of live fire confined to air to air combat above 5,000 feet. In the MOU, the Air Force formally agreed to assist in research projects involving potential impacts to the refuge resources from aircraft flights. Impacts of the flights on wilderness has not yet been studied.

No livestock grazing allowed--there are some renegade trespassing cows from Mexico. Draft CCP addresses this problem.

Draft Comprehensive Conservation Plan Management Program

Goal 1 Habitat, Wildlife and Plant, and Wilderness Management: To protect, maintain, enhance, and restore the diversity of the Sonoran desert represented on the Cabeza Prieta NWR. The Service will employ the following strategies including:

- Inventory and monitoring of natural resources;
- Managing to benefit the natural diversity of native species, particularly the desert bighorn sheep, Sonoran pronghorn, and other species that are federally endangered, and other plant and animal species of concern;
- Managing to reduce or eliminate introduced or non-native species;
- Managing to keep human impact on wildlife and plant resources at a minimum;
- Allowing natural processes to occur within the wilderness ecosystems;
- Permitting recreation forms in the wilderness that conforms to the mandates established in the Wilderness Act of 1964;
- Continue research effects of military activities of refuge resources.

Objective 1: Maintenance

- The refuge will monitor and maintain 17 developed waters with the Wilderness area, using the least intrusive methods possible.
- Four tanks will operate under natural refill conditions only. Unless emergency conditions arise, no water hauling will occur. The remaining 13 tanks will be monitored and actively maintained when necessary. Only during drought years will supplemental water be brought in.
- By 2000, the refuge staff, with AGFD will repair Buckthorn and Agua Dulce Tanks.
- By 1999, the staff will prepare an EA relating to mesquite removal at two charcos. The assessment will address the effect mesquite removal on migrating neotropical birds.

Monitoring

- Water monitoring for condition and content will occur as needed during normal and drought years.

- The monitoring tools for the wilderness waters are to be remote electronic devices camouflaged, aerial monitoring, and access by foot.
- By 1999, the refuge will implement the Recreational Impact Monitoring Plan. This plan actuates Designated Monitoring areas to identify environmental impacts such as off-roading impacts, amount of erosion, change of width, and damage to vegetation. Control Plots would be monitored. Through the use of GPS, former photopoint and transect locations will be used when possible.

Objective 2: Administrative Trails within Wilderness

- The refuge will reduce the routine use of motorized use of administrative trails in the wilderness by closing almost 28 miles of 159-mile system.
- Between the years 1999 and 2009, the refuge will restore 139 miles of obsolete trails.

Objective 3: Administrative Access to Non-wilderness

The refuge will allow staff, volunteers, and researchers to use motorized vehicles on a non-wilderness administrative trails. The refuge will continue to monitor the effects of vehicular access on non-wilderness trails.

Objective 4: Bighorn Sheep Management

- The refuge, in cooperation with the AGFD, will conduct sheep surveys at least triannually. Surveys will be conducted by helicopter, or other efficient means to gather data. The refuge sponsor or coordinate research studies on the suspected decline of the sheep population on Childs Mountain.

Objective 5: Management of Other Wildlife and Plant Populations

- The refuge will continue to monitor plant and animal species using current monitoring and surveying techniques.
- The refuge will determine what non-native species may be present and problematic, and take appropriate action. By 2010, the refuge will complete an inventory of sites in need of revegetation, and revegetate all disturbed areas with natives.
- The refuge will target xeroriparian areas for assessment of condition and suitability for neotropical birds, bats, and other wildlife. Based on this assessment, the refuge will: 1) eliminate any exotic species and replant with natives; and 2) conduct periodic water quality and quantity surveys in targeted areas.

Research Plots

- The refuge will expand the ecological program based on the following priorities: 1) recovery of threatened and endangered species; 2) inventory and monitoring of refuge plant and animal species; 3) monitoring change in native resources due to invasion of non-native species; and, 4) monitoring human impacts on the refuge.

Endangered Species Management

Sonoran Pronghorn

The Service will publish a final revised recovery plan. The refuge, in coordination with the AGFD, will conduct aerial surveys.

Lesser long-nosed bat

The Service would investigate the existence of other roost sites and/or habitats used on the refuge.

Objective 6: Monitoring and Evaluation/Recreational Impact Monitoring Plan

- By 1999, the refuge will implement the Recreational Impact Monitoring Plan. By 2004, the refuge will evaluate the baseline information and make recommendations for program adjustments and determine whether or not annual permit limitations will be set.
- The refuge will increase efforts to monitor and evaluate wildlife management activities, and human access and uses, especially recreational. Recreational activities will be evaluated for their potential impacts on natural resources.
- A 2-year monitoring program on the status of potential small game species and mule deer populations in order to determine compatibility with the potential to expand hunting opportunities.

Objective 7: Research Priorities

- **Endangered species:** Reanalyze available research pertaining to recovery of the Sonoran pronghorn and lesser long-nosed bat.
- **Effects of Developed Waters:** Reanalyze available data on the role of developed waters and how they affect desert bighorn sheep.
- **Biodiversity Studies and Ecological Research:** Research would include the whole range of plant and animal species including the inventory of cross-boundary ecological processes.
- **Water Quality Studies:** Additional research to enhance staff's knowledge about the quality of water within natural and developed catchments on the refuge.
- **Military Activities:** Analysis of military activities and the effect on wildlife would

provide guideline info for future military and refuge management frameworks.

- **Wilderness Resources:** Effects of human resources and visitation on refuge.
- **Archeological and Cultural Resources:** Research on archeological, cultural, and historical resource related info will be a valuable consideration for the management framework and will require consultation and involvement of the Hia-Ced O'odham, Tohono O'odham Nation, Yuman/Patayan Native Americans, and recognized professionals in the field.

Objective 8: Fire Management

- Fires will be dealt with on a case-by-case basis.

Objective 9: Border Management and Protection from Cattle Encroachment

- All trespassing Mexican cattle will be removed. The refuge will work the Mexican ranchers to prevent or curtail trespass incidents.
- By the year 2000, the refuge will negotiate a revised MOU with the Border Patrol and the Customs Service. The scope and limits of law enforcement will be adequately defined, as to allow the activity to take place with minimal disturbance to the diminishment of wilderness and refuge values.

Military Activities

- The Service will continue working with the military on removal of military debris on refuge lands.

Goal 2: Childs Mountain Management: To reduce the "footprint" of modern development on the mountain summit in the short term and eventually reclaim the summit for wildlife management purposes within a 25 to 50 year time frame. Full reclamation of the site will depend on the availability of funds and the eventual development of technologies that would eliminate the need for the current facilities.

Goal 3: Public Access and Recreational Activities: To provide reasonable levels of compatible access to visitors that result in a better appreciation and understanding of the plant, animal, and wilderness resources of the refuge, and to provide visitors with compatible, high quality, safe, wholesome, and enjoyable wildlife-dependent recreational experiences including hiking, hunting, wildlife observation, photography, and where applicable, appreciation of wilderness solitude.

Goal 4: Cultural Resources: In cooperation with Tohono O'odham Nation, Hia-ced O'odahm leaders, the State Historical Preservation Officer, to protect, maintain, and plan for the cultural resources on Cabeza Prieta NWR for the benefit of present and future generations.

Goal 5: Environmental Education and Interpretation: To implement educational and interpretive initiatives that enhance the public's understanding of the refuge's plant, animal, cultural and Wilderness resources and their place within the Sonoran Desert Ecosystem.

Goal 6: Cooperation with the Other Governmental Jurisdictions: To strengthen interagency and jurisdictional relationships in order to coordinate efforts with respect to refuge and surrounding area issues, resulting in decisions benefitting plant, wildlife, and wilderness resources on the refuge and the Sonoran Desert Ecosystem. These interagency relationships will include those with military agencies authorized by law to use the airspace above the refuge.

Goal 7: Refuge Administration, Staffing and Facilities: To have effective staffing, facilities and funding that will result in (a) long-lasting protection, maintenance, and enhancement to habitat, wildlife, and wilderness resources on the refuge; and (b) the provision of reasonable levels of compatible public recreation. Effective staffing and funding levels should lead to the achievement of the Refuge Purposes and Goals, the Service's Wilderness Objectives, and the Guiding Principles of the National Wildlife Refuge System.

References

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RECON. June 2000. Priority Vulnerable Species: Data Compilation and Synthesis. Pima County Administrator's Office.

Pima County. June 2000. Issues of Non-native Species in Public Reserves. Pima County Administrator's Office.

Buenos Aires National Wildlife Refuge

Size: 121,308 acres

Ownership/Managing Entity

- Owned and managed by the U.S. Fish and Wildlife Service

Reserve Document

Established August 11, 1985 after Congress approved to buy the Buenos Aires Ranch for the preservation of masked bobwhite.

Other legislative guidelines:

- Executive Order 12996
- National Wildlife Refuge Administration Act
- Refuge Recreation Act
- Endangered Species Act

Activities Allowed

- Birdwatching and wildlife observation
- Camping
- Hunting
- Environmental education
- Hiking
- Mountain biking
- Horseback riding

Known/Potential Biological Impact Areas and/or Activities

- Unknown

Priority Vulnerable Species

- Mexican long-tongued bat (*Choeronycteris mexicana*)
- Rufous-winged sparrow (*Aimophila carpalis*)
- Burrowing owl (*Athene cunicularia hypugaea*)
- Swainson's hawk (*Buteo swainsoni*)
- Cactus ferruginous pygmy owl (*Glaucidium brasilianum cactorum*)
- Abert's towhee (*Pipilo aberti*)
- Bell's vireo (*Vireo bellii*)
- Western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)
- Western box turtle (*Terrapene ornata luteola*)
- Chiricahua leopard frog (*Rana chiricahuensis*)

- Lowland leopard frog (*Rana yavapaiensis*)
- Pima pineapple cactus (*Corythantha scheeri* var *robotispina*)
- Mountain lion (*Felis concolor*)
- Desert tortoise (*Gopherus agassizii*)
- Kit fox (*Vulpes macrotis*)

Potentially Problematic Species

- Lehmann lovegrass
- Bullfrog
- Tiger salamanders
- Johnson grass

The refuge staff has been using controlled burns to curb the invasion of mesquite and to improve soil for native grasses and shrubs. Efforts to eliminate bullfrogs and tiger salamanders include drying ponds, fencing, and manual removal of the unwanted species.

Baseline Information

- *Detailed vegetation map: ?*
- *Plant inventory: Plant list*
- *Animal inventory: Bird list*
- *Water inventory (water sources, location, and permanency): Stock tanks and ponds inventoried 2/22/96.*

GAP Status

- Status 1a

Although a management plan for the Buenos Aires National Wildlife Refuge is not completed (due out in February 2000), it is managed for preservation of the endangered masked bobwhite. An approved management plan for the Buenos Aires Refuge may alter the GAP status classification.

Management

As part of the U.S. Fish and Wildlife Service's National Wildlife Refuge System, Buenos Aires follows the guidelines established by the National Wildlife Refuge Administration Act, Executive Order 12996, the Endangered Species Act, the Refuge Recreation Act, the Migratory Bird Treaty Act, and the National Historic Preservation Act. The U.S. Fish and Wildlife Service has the following mission: "to provide the Federal leadership to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of people. In support of the Service mission, the National Wildlife Refuge mission is "to provide, preserve, restore, and manage a national network of lands and waters sufficient in size, diversity, and location to meet society's needs for areas where the widest possible spectrum of benefits associated with wildlife and wildlands is enhanced and made available."

According to the unapproved 1997 BA Master Plan, mining claims exist along the eastern boundary of the refuge on BLM and USFS lands. State and deeded lands have the potential for increased mining activities.

Masked Bobwhite Recovery Plan

The refuge was established for the recovery of the masked bobwhite (*Colinus virginianus ridgwayi*). The Masked Bobwhite Recovery Plan outlines recovery actions, most of which, if not all, apply to the refuge. Actions include releasing a minimum of 2,000 birds per year into suitable habitat, monitoring populations, reestablish suitable experimental habitat and implement a habitat management program for BANWR, conduct a population viability analysis, and design long-term and comprehensive research programs (many more recovery actions were outlined, consult the Masked Bobwhite Recovery Plan for a complete list).

References

RECON. June 2000. Priority Vulnerable Species: Data Compilation and Synthesis. Pima County Administrator's Office.

Pima County. June 2000. Issues of Non-native Species in Public Reserves. Pima County Administrator's Office.

U.S. Forest Service- Coronado
National Forest

Districts

- Santa Catalina Ranger District
- Nogales Ranger District
- Sierra Vista Ranger District (Whetstone Mts.)

Research Natural Areas

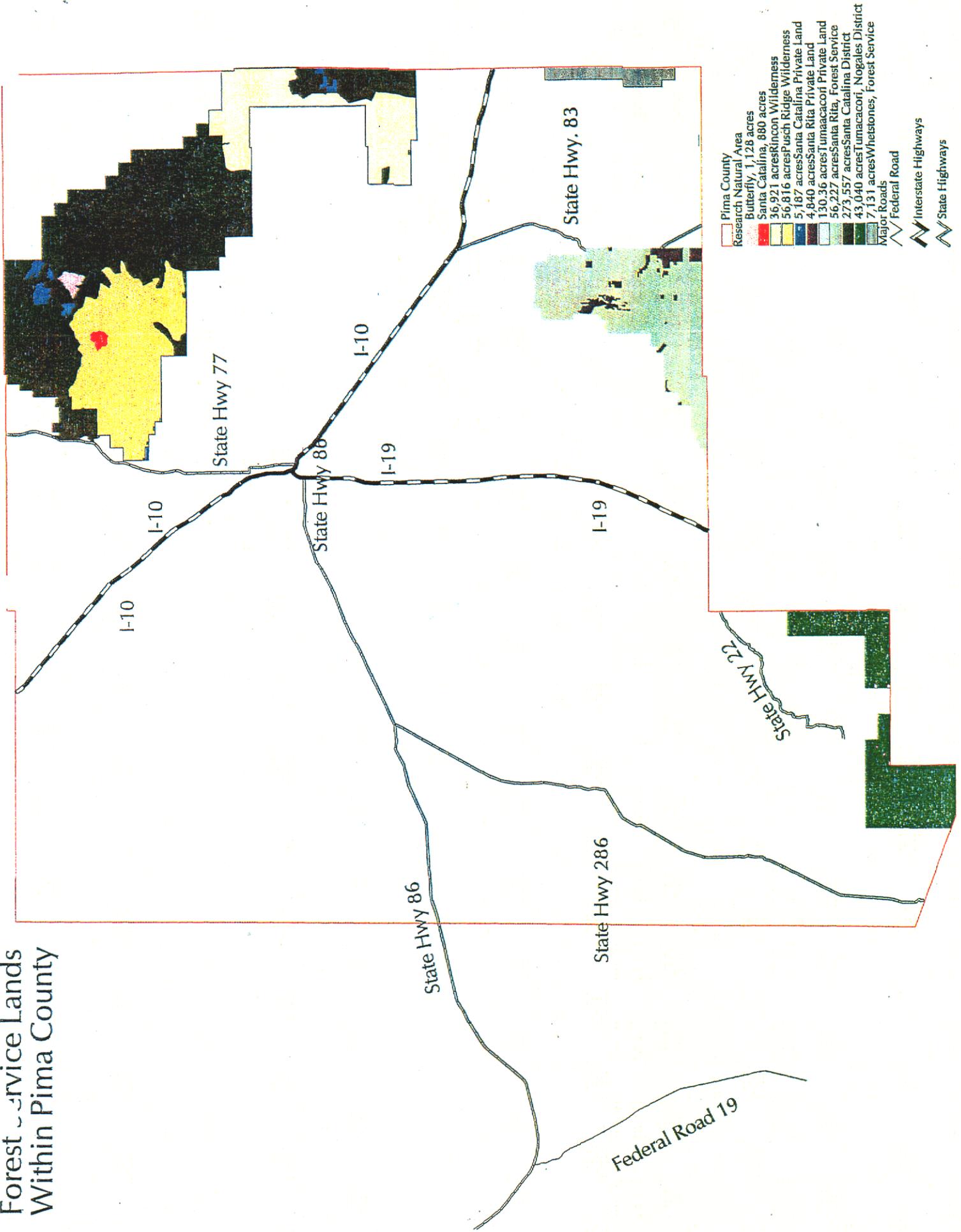
- Butterfly Research Natural Area
- Santa Catalina Research Natural Area

Wilderness Areas

- Rincon Wilderness
- Pusch Ridge Wilderness
- Mount Wrightson Wilderness

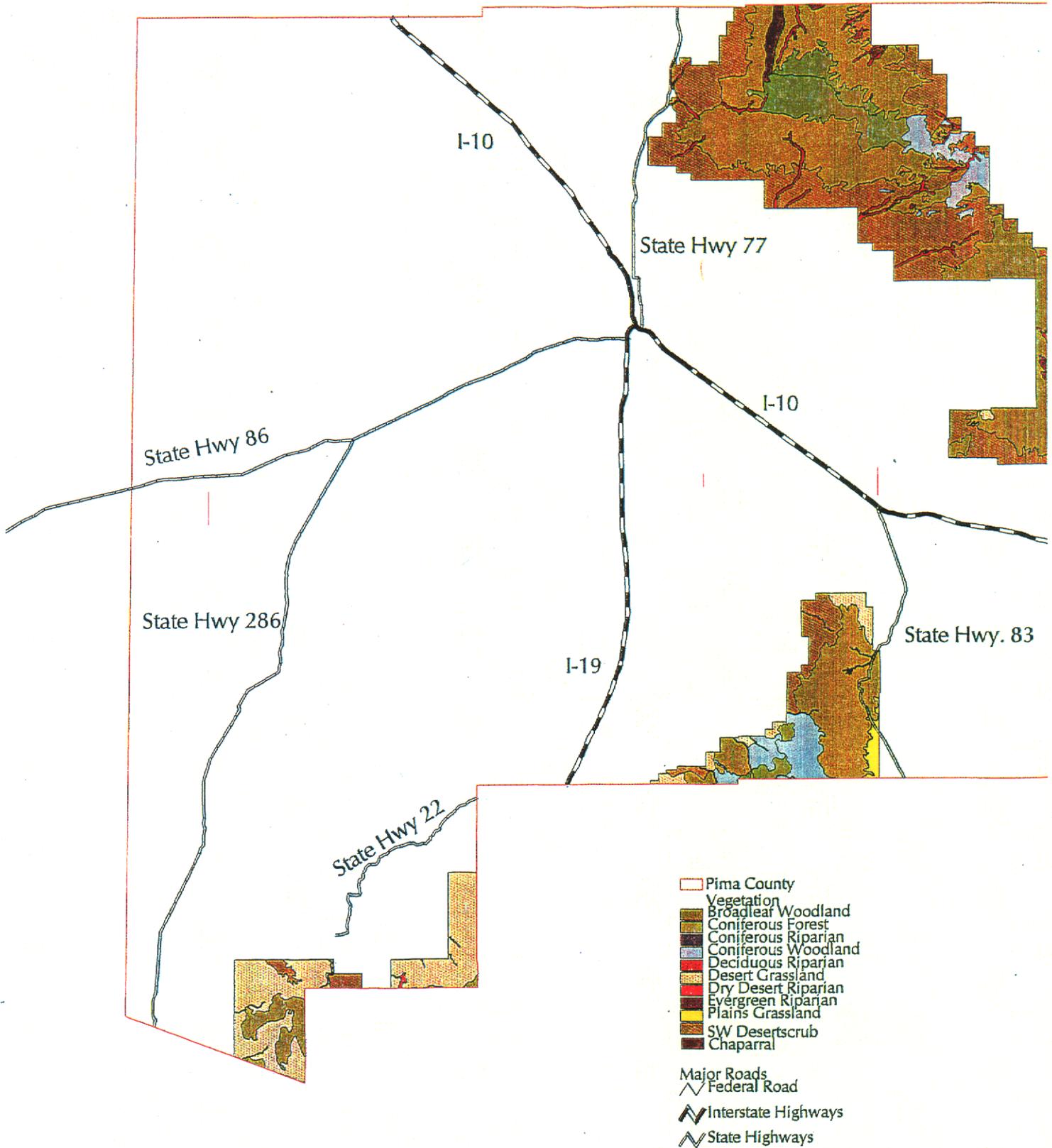
“Unreserved” Forest Lands

Forest Service Lands Within Pima County



- Pima County
- Research Natural Area
- Butterfly, 1,128 acres
- Santa Catalina, 880 acres
- Rincon Wildlife, 36,921 acres
- Pusch Ridge Wilderness, 56,816 acres
- Santa Catalina Private Land, 5,187 acres
- Santa Rita Private Land, 4,840 acres
- Tumacacori Private Land, 130.36 acres
- Santa Rita, Forest Service, 56,227 acres
- Santa Catalina District, 273,557 acres
- Tumacacori, Nogales District, 43,040 acres
- Whetstones, Forest Service, 7,131 acres
- Major Roads
- Federal Road
- Interstate Highways
- State Highways

Forest Service Lands Within Pima County Vegetation Types



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Vegetation Type	Acres
Broadleaf Woodland	150,615
Chaparral	3,780
Coniferous Forest	23,285
Coniferous Riparian	140
Coniferous Woodland	19,157
Deciduous Riparian	9,170
Desert Grassland	39,844
Dry Desert Riparian	364
Evergreen Riparian	759
Plains Grassland	2,378
SW Desertscrub	96,176
<i>Total Acres</i>	345,669

**Coronado National Forest
Santa Catalina Ranger District**

Size

- 273,557 Total acres in Pima County, including Research Natural Areas (RNAs), but excluding private inholdings
- 4,840 acres of private inholdings within the Forest boundary

- Santa Catalina RNA: 880 acres
- Butterfly RNA: 1,128 acres

Ownership/Managing Entity

- USDA-Forest Service, Coronado National Forest

Activities Allowed

- | | | |
|-----------------------------|--------------------|----------------------------------|
| - Mining | - Fishing | - Surface water diversions |
| - Aggregate or fill removal | - Trapping | - Stock tanks |
| - Landfills | - Hiking | - New utilities |
| - Sewage treatment | - Camping | - Grazing |
| - New roadways | - Mountain biking | - Archery/rifle range |
| - Groundwater pumping | - Woodcutting | - Public education |
| - Hunting | - Horseback riding | - Recreational residences |
| | - Picnicking | - Commercial recreation services |
| | - Skiing | |

Known/Potential Biological Impact Areas and/or Activities

- The Santa Catalina Ranger District is managed for multiple uses, including timber, grazing, recreation, watershed protection, and wildlife habitat. Some uses are known to impact the flora and fauna. For instance, a multi-species Biological Opinion (AESO/SE 2-21-98-F-399) identifies grazing effects.

Priority Vulnerable Species

Mammals:

- Jaguar (*Panthera onca*)
- Lesser long-nosed bat (*Leptonycteris curasoae yerbanbuena*)
- Arizona shrew (*Sorex arizonae*)
- Desert bighorn sheep (*Ovis canadensis mexicana*)
- Mexican long-tongued bat (*Choeronycteris mexicana*)
- Allen's big-eared bat (*Idionycteris phyllotis*)
- Western red bat (*Lasiurus blossevillii*)
- Pale Townsend's big-eared bat (*Plecotus townsendii pallescens*)

Birds:

- American peregrine falcon (*Falco peregrinus anatum*)
- Cactus ferruginous pygmy owl (*Glaucidium brasilianum cactorum*)
- Mexican spotted owl (*Strix occidentalis lucida*)
- Apache northern goshawk (*Accipiter gentiles apache*)
- Common black hawk (*Buteogallus anthracinus*)
- Western yellow-billed cuckoo (*Coccyzus americanus ssp occidentalis*)
- Rufous-winged sparrow (*Aimophila carpalis*)
- Swainson's hawk (*Buteo swainsoni*)
- Abert's towhee (*Pipilo aberti*)
- Bell's vireo (*Vireo bellii*)

Reptiles:

- Sonoran desert tortoise (*Gopheris agassizii*)
- Giant spotted whiptail (*Cnemidophorus burti stictigrammus*)
- Mexican garter snake (*Thamnophis eques megalops*)
- Ground snake (*Sonora semiannulata*)-believed to be present, not necessarily confirmed.

Amphibians:

- Lowland leopard frog (*Rana yavapaiensis*)

Fish:

- Gila topminnow (*Poeciliopsis occidentalis occidentalis*)
- Gila chub (*Gila intermedia*)

Insects:

- Arizona metalmark (*Calephelis arizonensis*)
- Arxna giant skipper (*Agathymus arxna*)
- Chiricahua white (*Neophasia terlootii*)
- False ameleus mayfly (*Ameletus falsus*)
- Mountain silverspot butterfly (*Speyeria nokomis nitocris*)
- Obsolete viceroy (*Limenitis archippus obsoleta*)
- Pima orange tip (*Anthocharis pima*)
- Poling's giant skipper (*Agathymus polingi*)
- Sabino Canyon damselfly (*Argia sabino*)
- A tiger beetle (*Amblycheila baroni*)
- Ursine giant skipper (*Megathymus ursus*)

Plants:

- Aravaipa sage (*Salvia amissa*)
- Arizona alum root (*Heuchera glomerulata*)
- Arizona giant sedge (*Carex ultra*)
- Arizona manihot (*Manihot davisiae*)
- Arizona monkshood (*Aconitum infectum*)
- Bartram stonecrop (*Graptopetalum bartramii*)
- Bigelow thoroughwort (*Eupatorium bigelovii*)
- Box Canyon muhly (*Muhlenbergia dubiodes*)
- Catalina beardtongue (*Penstemon discolor*)
- Chihuahuan sedge (*Carex chihuahuensis*)
- Chihuahuan stickseed (*Hackelia ursine*)

- Chiricahua Mountain brookweed (*Samolus vagans*)
- Chiricahua rock cress (*Arabis tricomuta*)
- Counter-clockwise fishhook cactus (*Mammillaria mainiae*)
- Goodding's onion (*Allium gooddingii*)
- Lemmon's lupine (*Lupinus lemmonii*)
- Lemmon's morning glory (*Ipomoea tenuiloba* var. *lemmonii*)
- Lemmon's stevia (*Stevia lemmonii*)
- Mock pennyroyal (*Hedeoma dentatum*)
- Nodding blue-eyed grass (*Sisyrinchium cernuum*)
- Pima Indian mallow (*Abutilon parishii*)
- Rusby hawkweed (*Hieracium rusbyi*)
- Shade violet (*Viola umbraticola*)
- Sparseleaf hermannia (*Hermannia pauciflora*)
- Superd beardtongue (*Penstemon superbus*)
- Sycamore Canyon muhly (*Muhlenbergia xerophila*)
- Trelease agave (*Agave schottii* var. *treleasei*)
- Tumamoc globeberry (*Tumamoca macdougallii*)
- Wiggins milkweed vine (*Metastelma mexicanum*)

Candidates for Species Reestablishment

- Gila topminnow
- Sonoran chub
- Chiricahua leopard frog

Potentially Problematic Species

- Bullfrog
- Crayfish
- Exotic fish
- Sweet resinbush
- Pentzia
- Fountain grass
- Giant reed
- Salt cedar

Baseline Information

- *Detailed Vegetation Map:* Not available; a generalized GIS vegetation type map is available, based on mapping at 1:62,500
- *Flora/Fauna Lists:* AZ Game & Fish Heritage Database
- *Water Inventory:* Watercourses (streams and stock tanks) and water bodies (springs, windmills) available as ArcView themes, based on 1:24,000 mapping

GAP Status

- *Unreserved Coronado National Forest*
Status 3b

Management (Coronado National Forest Plan, 1986)

The mission, goals, and objectives for the Coronado National Forest are attained through applying groups of management practices and activities (prescriptions) to specific units of land (management areas). The Santa Catalina Ranger District has 8 management areas within its boundaries. A brief description of the management areas is given below.

Management Area 1: Visual Resources and Semi-primitive Dispersed Recreation

Management Emphasis and Intensity: Manage for visual resources and semi-primitive dispersed recreation opportunities including those related to wildlife. Visual quality objectives will be met.

Management Area Description: These are steep, rugged lands with slopes greater than 40%. Generally have been determined incapable or unsuitable for sustained wood harvest and livestock grazing. Includes all veg types except major riparian areas.

Management Area 2: Dispersed Recreation and Timber Harvest

Management Emphasis and Intensity: Manage for dispersed recreation opportunities. Electronic sites and observatories will be permitted on special sites. Sawtimber and fuelwood harvest will be done to enhance recreation, visual quality, and wildlife values. Visual quality objectives will be met, and watershed conditions will be maintained or improved.

Management Area Description: These lands include coniferous forests that are suitable for a wide variety of recreational and special uses. Slopes are less than 40%. Includes both suitable and unsuitable timber producing lands. These lands are located in the Santa Rita, and Santa Catalina Mountains.

Management Area 3: Dispersed Recreation

Management Emphasis and Intensity: Managed for a variety of dispersed recreation while protecting and maintaining natural and cultural resources. Recreational opportunities will be maintained or enhanced. Visual quality objectives will be met. Watershed conditions will be improved or maintained.

Management Area Description: Undeveloped grasslands, woodlands, coniferous forest and riparian areas that have high attraction to recreationists. Many are near developed recreation sites, but may not be developed themselves. Includes known essential habitats for threatened and endangered plants and animals.

Management Area 4: Livestock Grazing (Level D), Game Habitat, and Fuelwood Harvest

Management Emphasis and Intensity: Managed to maintain and improve game habitat while sustaining harvest of livestock forage and fuelwood. Impacts on cultural resources and non-game wildlife habitats would be fully mitigated. Dispersed recreation activities may occur except for those that adversely affect the productivity of the land or resources. Watershed and soil conditions will be improved or maintained.

Management Area Description: Lands with average slopes under 40% that are capable and suitable to support fuelwood harvest, livestock grazing, and game habitat management. Includes desert scrub, grassland, chaparral, and woodland vegetative types.

Management Area 7: Unique Resources (including riparian areas)

Management area 7 has been given two different prescriptions due to the blending and indistinct differences between riparian vegetation types. Prescription A is intended for capability types 11AR (wet deciduous riparian) and 12R (wet coniferous riparian). Prescription B is intended for capability types 10R (dry desert riparian) and 11BR (dry oak riparian).

Prescription A

Management Emphasis and Intensity: Manage to perpetuate the unique wildlife or vegetative species. Improve and manage riparian areas to benefit riparian dependent resources. Dispersed recreation activities or other uses are allowed to the extent that they do not degrade the unique values. Facilities may be allowed and maintained for the purpose of protecting these resources. Visual quality objectives will be met.

Management Area Description: Undeveloped lands that have been identified as supporting flora and fauna associations that are unique enough to require special management practices. Includes identified riparian ecotypes. Includes deciduous and coniferous forest types. Includes known essential habitats for threatened and endangered species.

Prescription B

Management Emphasis and Intensity: Manage to perpetuate the unique wildlife or vegetative species while producing livestock forage and fuelwood on a sustained basis. Recreation activities and other uses may occur to the extent they do not degrade the unique values. Visual quality objectives will be met. Facilities may be allowed and maintained for the purpose of protecting these resources.

Management Area Description: Undeveloped lands that have been identified as supporting floral and faunal associations that are unique enough to require special management practices. Includes identified higher ecosystem extensions, such as oak and mesquite bottoms. Includes known, essential habitats for threatened and endangered species.

Management Area 8: Research Natural Areas

Management Emphasis and Intensity: Manage to provide opportunities for nondisruptive research and education. Use restrictions will be imposed as necessary to keep areas in their climax state. There will be no harvest of forest products including fuelwood.

Management Area Description: Includes those lands that have been determined to be suitable for designation as research natural areas. Includes Butterfly RNA.

Management Area 8A: Research Natural Areas and Wilderness:

Management Emphasis and Intensity: Manage for wilderness values and uses while providing opportunities for nondisruptive research and education. Use restrictions will be imposed as necessary to keep areas in their climax state. There will be no harvest of forest products including fuelwood.

Management Area Descriptions: Includes those lands that have been determined to be suitable for both wilderness designation and designation as research natural areas. Includes Santa Catalina RNA.

Management Area 9: Wilderness

Management Emphasis and Intensity: Manage for wilderness values while providing livestock grazing and providing recreation opportunities that are compatible with maintaining wilderness values and protecting resources. Fire management emphasis will be to permit lightning caused fires to play, as nearly as possible, their natural ecological role within wilderness.

Management Area Description: Include all vegetative and land form types that have been determined to be suitable for wilderness designation. Includes the following areas: Pusch Ridge and Rincon Mountain Wilderness.

Restoration

Data not available at this time.

Monitoring

The Forest Plan includes a monitoring plan to evaluate attainment of Plan goals and to measure key administrative parameters. Monitoring elements include:

Recreation: Actual dispersed use in Recreation Opportunity Spectrum settings
Developed site use
Recreation use satisfaction
Condition of developed sites in the public sector

Wilderness: Wilderness use by Wilderness Opportunity Spectrum class

Visual Quality: The effect of management activities on acres of visual quality objectives

Wildlife: Population and habitat trends of management indicator species

Range: Actions to bring unsatisfactory ranges to satisfactory condition
Range condition and trend
New or revised range management plans
Range development
Permitted use
Grazing capacity

Soil & Water: Productivity and hydrologic functioning as represented by watershed condition ratings

Riparian Areas: Condition of riparian areas

Protection: Fire suppression effectiveness
Insure destructive insect and disease do not increase to damaging levels following management activities
Visibility in Class 1 Wilderness

Timber & Fuelwood: Insure acres are properly treated according to management prescription
Cords of fuelwood made available

Review maximum size limits of harvest areas to determine whether the limits should be continued
Adequate restocking of harvested lands
Re-evaluate unsuitable timber lands

Cultural Resources: Avoidance of damage to or loss of cultural resources by management activities.

Loss of, or damage to, cultural resources through weathering or vandalism

Costs: Unit costs
Total annual budget
Budget by program component

Standards & Guidelines: Plan implementation

Outputs: Management attainment report items

References

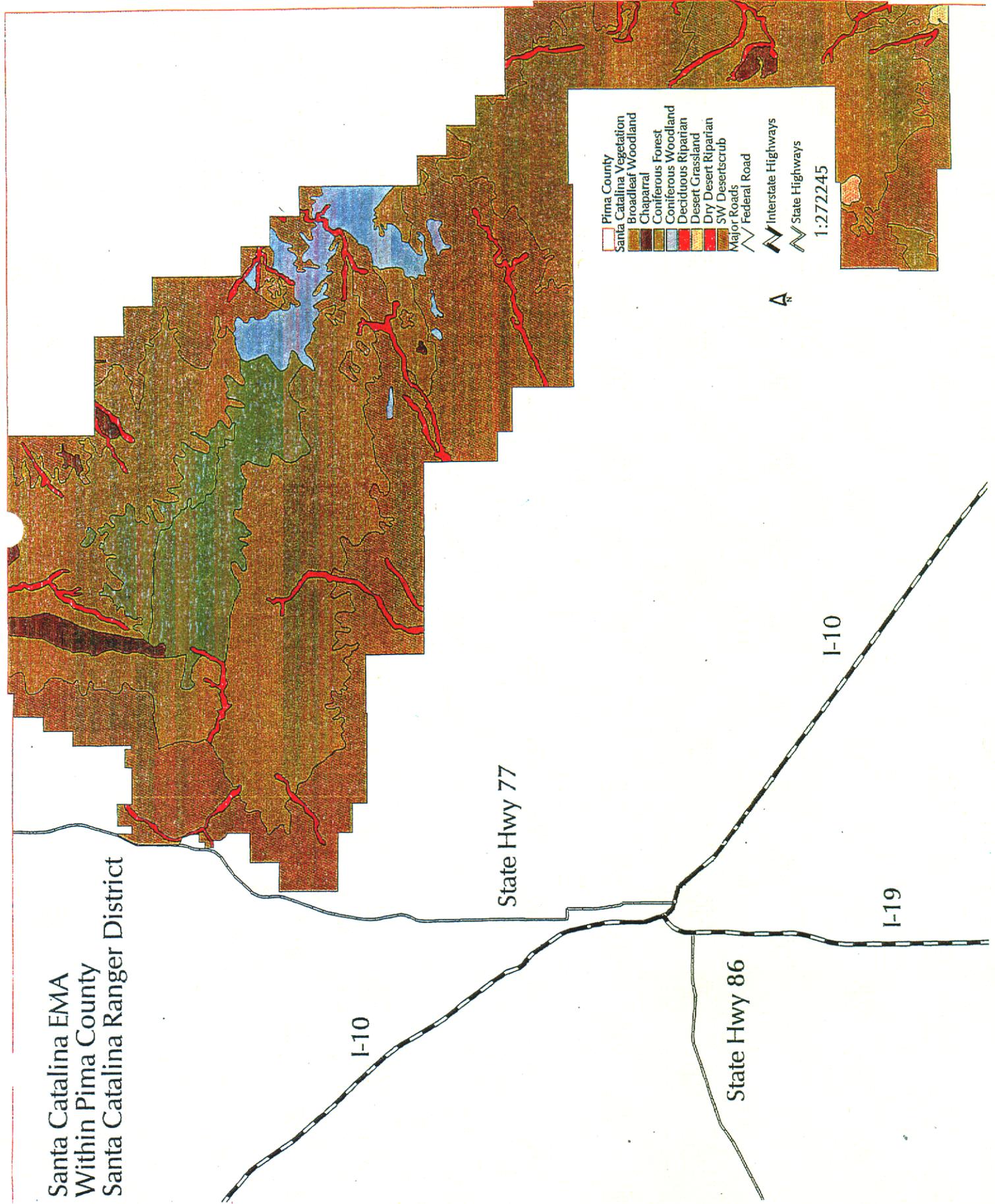
RECON. June 2000. *Priority Vulnerable Species: Data Compilation and Synthesis*. Pima County Administrator's Office.

Pima County. June 2000. *Issues of Non-native Species in Public Reserves*. Pima County Administrator's Office.

Kingsley, Ken. 2000. *DRAFT Potentially Problematic Species in Pima County*. Pima County Administrator's Office.

USDA Forest Service. 1986. *Coronado National Forest Plan*.

Santa Catalina EMA
Within Pima County
Santa Catalina Ranger District



- Pima County
- Santa Catalina Vegetation
- Broadleaf Woodland
- Chaparral
- Coniferous Forest
- Coniferous Woodland
- Deciduous Riparian
- Desert Grassland
- Dry Desert Riparian
- SW Desertscrub
- Major Roads
- Federal Road
- Interstate Highways
- State Highways

1:272245



I-10

State Hwy 77

State Hwy 86

I-10

I-19

Santa Catalina EMA within Pima County	Vegetation Type	Acres	Total Acres
	Broadleaf Woodland	106,442	
	Chaparral	3,780	
	Coniferous Forest	20,810	
	Coniferous Woodland	8,932	
	Deciduous Riparian	8,269	
	Desert Grassland	585	
	Dry Desert Riparian	196	
	SW Desertscrub	85,287	
			234,301

**Coronado National Forest
Nogales Ranger District**

Size

- Total acres in Pima County: 99,267 (exclusive of private inholdings)
- 4,970 acres of private inholdings within Forest boundary

Ownership/Managing Entity

- USDA Forest Service, Coronado National Forest

Activities Allowed

- | | | | | |
|-----------------------------|---|------------------|---|--------------------------------|
| - Mining | - | Fishing | - | Surface water diversions |
| - Aggregate or fill removal | - | Trapping | - | Stock tanks |
| - Landfills | - | Hiking | - | New utilities |
| - Sewage treatment | - | Camping | - | Grazing |
| - New roadways | - | Mountain biking | - | Archery/rifle range |
| - Groundwater pumping | - | Woodcutting | - | Public education |
| - Hunting | - | Horseback riding | - | Recreational residences |
| | | Picnicking | - | Commercial recreation services |
| | | Skiing | - | |

Potential/Known Biological Impact Areas and/or Activities

- The Nogales Ranger District is managed for multiple uses, including timber, grazing, recreation, watershed protection, and wildlife habitat. Some uses are known to impact the flora and fauna. For instance, a multi-species Biological Opinion (AESO/SE 2-21-98-F-399) identifies grazing effects.

Priority Vulnerable Species

Mammals:

- Jaguar (*Panthera onca*)
- Jaguarundi (*Felis yagouaroundi tolteca*)
- Lesser long-nosed bat (*Leptonycteris curasoae yerbanbuena*)
- Mexican gray wolf (*Canis lupus baiyleyi*)
- Arizona shrew (*Sorex arizonae*)
- Southern pocket gopher (*Thomomys umbrinus intermedius*)
- Mexican long-tongued bat (*Choeronycteris mexicana*)
- California leaf-nosed bat (*Macrotus californicus*)
- Pale Townsend's big-eared bat (*Plecotus townsendii pallescens*)
- Arizona shrew (*Sorex arizonae*)—believed to be present, not necessarily confirmed

Birds:

- American peregrine falcon (*Falco peregrinus anatum*)
- Bald eagle (*Haliaeetus leucocephalus*)
- Cactus ferruginous pygmy owl (*Glaucidium brasilianum cactorum*)

- Masked bobwhite (*Colinus virginianus ridgwayi*)
- Mexican spotted owl (*Strix occidentalis lucida*)
- Northern aplomado falcon (*Falco femoralis septentrionalis*)
- Apache northern goshawk (*Accipiter gentiles apache*)
- Bell's vireo (*Vireo bellii*)
- Common black hawk (*Buteogallus anthracinus*)
- Northern gray hawk (*Asturina nitida maxima*)
- Western yellow-billed cuckoo (*Coccyzus americanus ssp occidentalis*)
- Swainson's hawk (*Buteo swainsoni*)

Reptiles:

- Sonoran desert tortoise (*Gopheris agassizii*)
- Arizona ridge-nosed rattlesnake (*Crotalus willardi willardi*)
- Giant spotted whiptail (*Cnemidophorus burti stictigrammus*)

Amphibians:

- Chiricahua leopard frog (*Rana chiricahuensis*)
- Lowland leopard frog (*Rana yavapaiensis*)

Insects:

- Arizona metalmark (*Calephelis arizonensis*)
- Aryxna giant skipper (*Agathymus aryxna*)
- Evansi brigadier (*Agathymus evansi*)
- False ameletus mayfly (*Ameletus falsus*)
- Mexican meadowfly (*Sympetrum signiferum*)
- Obsolete viceroy (*Limenitis archippus obsoleta*)
- Pima orange tip (*Anthocharis pima*)
- Poling's giant skipper (*Agathymus polingi*)
- Stephan's heterelmis riffle beetle (*Heterelmis stephani*)
- A tiger beetle (*Amblycheila baroni*)
- Ursine giant skipper (*Megathymus ursus*)

Plants:

- Pima pineapple cactus (*Coryphantha scheen var. robustispina*)
- Alamos deer vetch (*Lotus alamosanus*)
- Arid throne fleabane (*Erigeon arisolium*)
- Arizona giant sedge (*Carex ultra*)
- Arizona manihot (*Manihot davisiae*)
- Arizona monkshood (*Aconitum infectum*)
- Bartram stonecrop (*Graptopetalum bartramii*)
- Beardless chinch weed (*Pectis imberbis*)
- Box Canyon muhly (*Muhlenbergia dubiodes*)
- Branching penstemon (*Penstemon ramosus*)
- Broad leaf ground cherry (*Physalis latiphysa*)
- Chihuahuan sedge (*Carex chihuahuensis*)
- Chihuahuan stickseed (*Hackelia ursine*)

- Chiricahua rock cress (*Arabis tricomuta*)
- Chisos coral root (*Hexalectris revolute*)
- Foetid passion flower (*Passiflora foetida*)
- Gentry indigo bush (*Dalea tentaculoides*)
- Huachuca groundsel (*Senecio huachucanus*)
- Huachuca Mountain lupine (*Lupinus huachucanus*)
- Large-flowered blue star (*Amsonia grandiflora*)
- Lemmon lily (*Lilium parryi*)
- Lemmon milkweed (*Asclepia lemmonii*)
- Lemmon's lupine (*Lupinus lemmonii*)
- Lemmon's stevia (*Stevia lemmonii*)
- Lumholtz nightshade (*Solanum lumholtzianum*)
- Mexican broomspurge (*Euphorbia gracillima*)
- Mock pennyroyal (*Hedeoma dentalum*)
- Nodding blue-eyed grass (*Sisyrinchium cernuum*)
- Santa Cruz beehive cactus (*Coryphantha recurvata*)
- Santa Cruz star leaf (*Choisya mollis*)
- Santa Cruz striped agave (*Agave parviflora* spp *parviflora*)
- Seeman groundsel (*Senecio hartwegii*)
- Smooth ayenia (*Ayenia glabra*)
- Sonoran noseburn (*Tragia laciniata*)
- Superd beardtongue (*Penstemon superbus*)
- Supine bean (*Macroptilum supinum*)
- Sweet acacia (*Acacia smallii*)
- Thurber hoary pea (*Tephrosia thurberi*)
- Thurber's morning glory (*Ipomoea thurberi*)
- Trans-Pecos Indian paintbrush (*Castilleja nervata*)
- Tucson Mountain spiderling (*Boerhavia megaptera*)
- Virlet paspalum (*Paspalum verletii*)
- Wiggins milkweed vine (*Metastelma mexicanum*)
- Woolly fleabane (*Laennecia eriophylla*)

Candidates for Species Reestablishment

- Aplomado falcon
- Gila topminnow
- Sonoran chub
- Chiricahua leopard frog
- Mexican gray wolf (areas considered but dropped)

Potentially Problematic Species

- Bullfrogs
- Crayfish
- Non-native fish
- Buffel grass
- Other exotic grasses
- Tree of Heaven

Baseline Information

- *Detailed Vegetation Map*: Not available; a generalized GIS vegetation type map is available, based on mapping at 1:62,500
- *Flora/fauna Lists*: AZ Game & Fish Heritage Database
- *Water Inventory*: Watercourses (streams and stock tanks) and water bodies (springs, windmills) available as ArcView themes, based on 1:24,000 mapping

GAP Status

Unreserved Coronado National Forest
Status 3b

Management (Coronado National Forest Plan, 1986)

The mission, goals, and objectives for the Coronado National Forest are attained through applying groups of management practices and activities (prescriptions) to specific units of land (management areas). The Nogales Ranger District has 8 management areas within its boundaries. A brief description of the management areas is given below.

Management Area 1: Visual Resources and Semi-primitive Dispersed Recreation

Management Emphasis and Intensity: Manage for visual resources and semi-primitive dispersed recreation opportunities including those related to wildlife. Visual quality objectives will be met.

Management Area Description: These are steep, rugged lands with slopes greater than 40%. Generally have been determined incapable or unsuitable for sustained wood harvest and livestock grazing. Includes all veg types except major riparian areas.

Management Area 4: Livestock Grazing (Level D), Game Habitat, and Fuelwood Harvest

Management Emphasis and Intensity: Managed to maintain and improve game habitat while sustaining harvest of livestock forage and fuelwood. Impacts on cultural resources and non-game wildlife habitats would be fully mitigated. Dispersed recreation activities may occur except for those that adversely affect the productivity of the land or resources. Watershed and soil conditions will be improved or maintained.

Management Area Description: Lands with average slopes under 40% that are capable and suitable to support fuelwood harvest, livestock grazing, and game habitat management. Includes desert scrub, grassland, chaparral, and woodland vegetative types.

Management Area 7: Unique Resources (including riparian areas)

Management area 7 has been given two different prescriptions due to the blending and indistinct differences between riparian vegetation types. Prescription A is intended for capability types 11AR (wet deciduous riparian) and 12R (wet coniferous riparian). Prescription B is intended for capability types 10R (dry desert riparian) and 11BR (dry oak riparian).

Prescription A

Management Emphasis and Intensity: Manage to perpetuate the unique wildlife or vegetative species. Improve and manage riparian areas to benefit riparian dependent resources. Dispersed recreation activities or other uses are allowed to the extent that they do not degrade the unique values. Facilities may be allowed and maintained for the purpose of protecting these resources. Visual quality objectives will be met.

Management Area Description: Undeveloped lands that have been identified as supporting flora and fauna associations that are unique enough to require special management practices. Includes identified riparian ecotypes. Includes deciduous and coniferous forest types. Includes known essential habitats for threatened and endangered species.

Prescription B

Management Emphasis and Intensity: Manage to perpetuate the unique wildlife or vegetative species while producing livestock forage and fuelwood on a sustained basis. Recreation activities and other uses may occur to the extent they do not degrade the unique values. Visual quality objectives will be met. Facilities may be allowed and maintained for the purpose of protecting these resources.

Management Area Description: Undeveloped lands that have been identified as supporting flora and fauna associations that are unique enough to require special management practices. Includes identified higher ecosystem extensions, such as oak and mesquite bottoms. Includes known, essential habitats for threatened and endangered species.

Management Area 9: Wilderness

Management Emphasis and Intensity: Manage for wilderness values while providing livestock grazing and providing recreation opportunities that are compatible with maintaining wilderness values and protecting resources. Fire management emphasis will be to permit lightning caused fires to play, as clearly as possible, their natural ecological role within wilderness.

Management Area Description: Include all vegetative and land form types that have been determined to be suitable for wilderness designation. Includes the following areas: Pusch Ridge and Rincon Mountain Wilderness.

Restoration

No data available at this time.

Monitoring

The Forest Plan includes a monitoring plan to evaluate attainment of the Plan goals and to measure key administrative parameters. Monitoring elements include:

Recreation: Actual dispersed use in Recreation Opportunity Spectrum settings
Developed site use
Recreation use satisfaction
Condition of developed sites in the public sector

Wilderness: Wilderness use by Wilderness Opportunity Spectrum class

Visual Quality: The effect of management activities on acres of visual quality objectives

Wildlife: Population and habitat trends of management indicator species

Range: Actions to bring unsatisfactory ranges to satisfactory condition

- Range condition and trend
- New or revised range management plans
- Range development
- Permitted use
- Grazing capacity

Soil & Water: Productivity and hydrologic functioning as represented by watershed condition ratings

Riparian Areas: Condition of riparian areas

Protection: Fire suppression effectiveness
Insure destructive insect and disease do not increase to damaging levels following management activities
Visibility in Class 1 Wilderness

Timber & Fuelwood: Insure acres are properly treated according to management prescription
Cords of fuelwood made available
Review maximum size limits of harvest areas to determine whether the limits should be continued
Adequate restocking of harvested lands
Re-evaluate unsuitable timber lands

Cultural Resources: Avoidance of damage to or loss of cultural resources by management activities.
Loss of, or damage to, cultural resources through weathering or vandalism

Costs: Unit costs
Total annual budget
Budget by program component

Standards & Guidelines: Plan implementation

Outputs: Management attainment report items

References

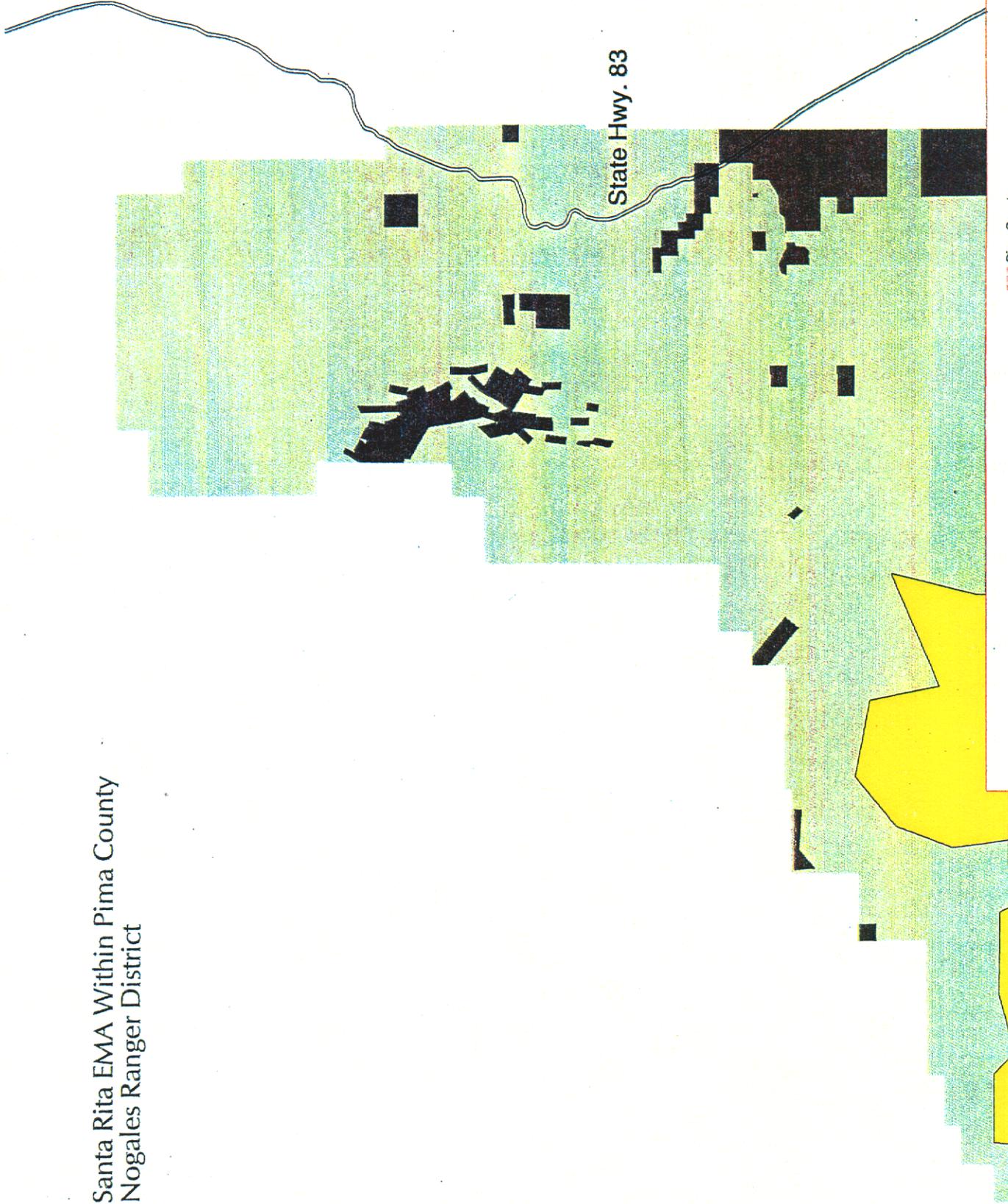
RECON. June 2000. *Priority Vulnerable Species: Data Compilation and Synthesis*. Pima County Administrator's Office.

Pima County. June 2000. *Issues of Non-native Species in Public Reserves*. Pima County Administrator's Office.

Kingsley, Ken. 2000. *DRAFT Potentially Problematic Species in Pima County*. Pima County Administrator's Office.

USDA Forest Service. 1986. *Coronado National Forest Plan*.

Santa Rita EMA Within Pima County
Nogales Ranger District

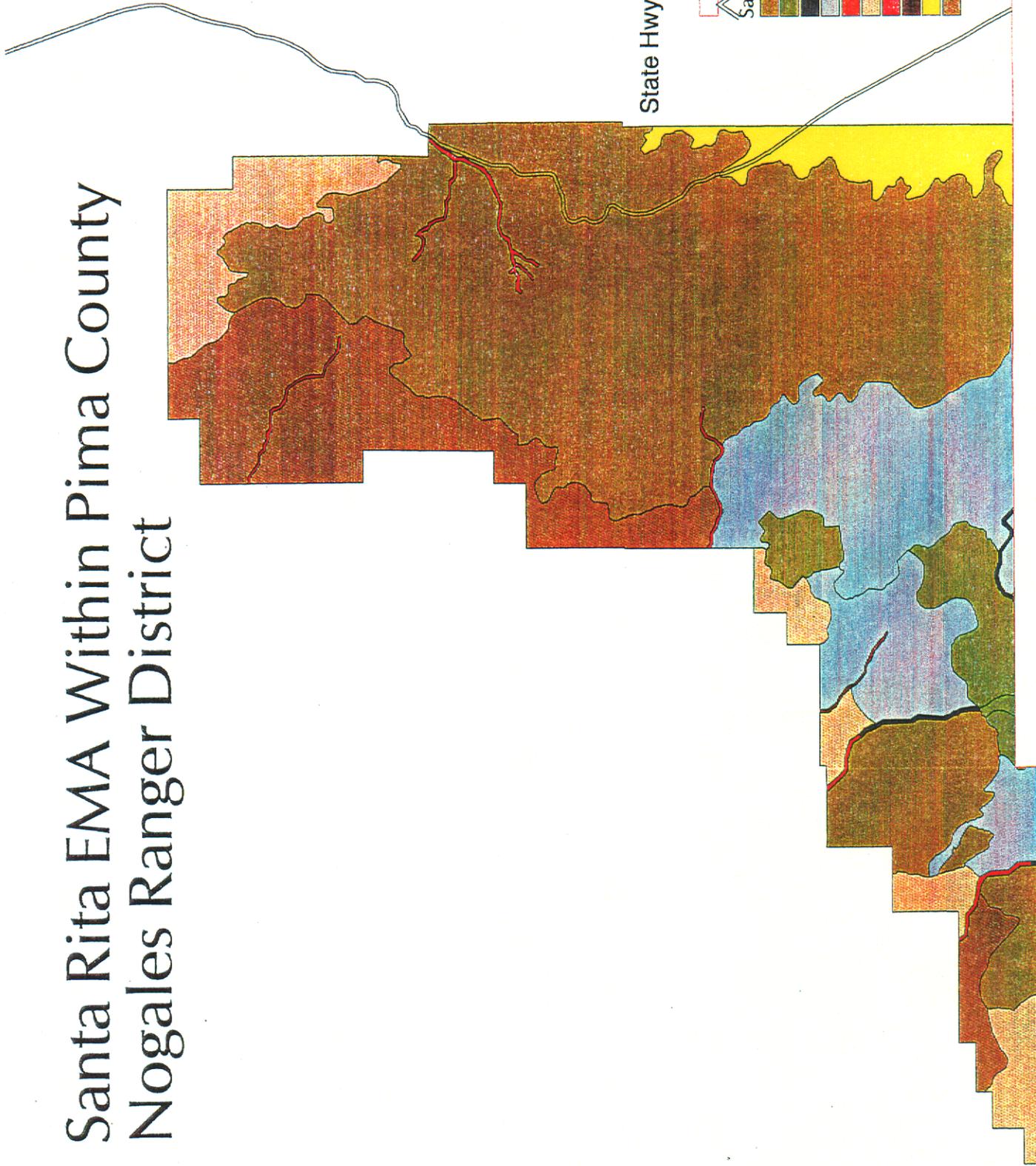


Pima County
State Highway 83
3,928 acres-Mt. Wrightson Wilderness
4,940 acres-Santa Rita Private Land
56,227 acres-Santa Rita, Forest Service

1:133128



Santa Rita EMA Within Pima County Nogales Ranger District



Santa Rita EMA Nogales R.D. within Pima County	Vegetation Type	Acres
	Broadleaf Woodland	31,871
	Coniferous Forest	2,475
	Coniferous Woodland	10,225
	Deciduous Riparian	281
	Desert Grassland	5,084
	Dry Desert Riparian	168
	Evergreen Riparian	44
	Plains Grassland	2,378
	SW Desertscrub	8,401
<i>Total Acres</i>		60,927

Tumacacori EMA Within Pima County
Nogales Ranger District

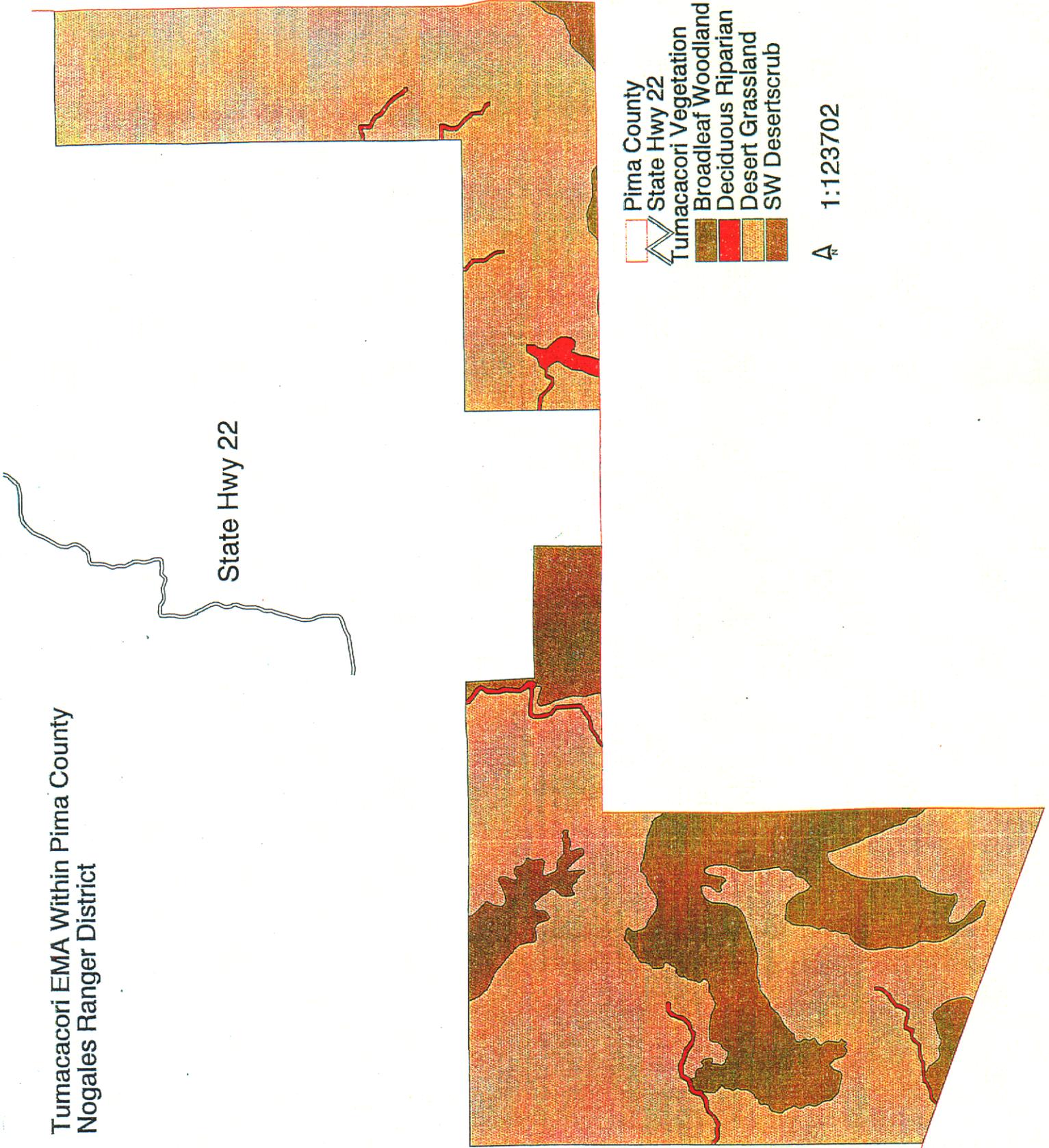
State Hwy 22



Pima County
State Hwy 22
130.36 acres Tumacacori Private Land
43,040 acres Tumacacori, Nogales District

A 1:123702

Tumacacori EMA Within Pima County
Nogales Ranger District



State Hwy 22

- Pima County
- State Hwy 22
- Tumacacori Vegetation
- Broadleaf Woodland
- Deciduous Riparian
- Desert Grassland
- SW Desertscrub

A 1:123702

Tuma EMA Nogales R.D. within Pima County	Vegetation Type	Acres
	Broadleaf Woodland	6,880
	Deciduous Riparian	621
	Desert Grassland	33,182
	SW Desertscrub	2,488
<i>Total Acres</i>		43,170

**Coronado National Forest
Sierra Vista Ranger District**

Size

- Total acres in Pima County: 7,131
- No private inholdings within National Forest System lands in Pima County

Ownership/Managing Entity

- USDA Forest Service, Coronado National Forest

Activities Allowed

- | | | |
|-----------------------------|--------------------|----------------------------------|
| - Mining | - Fishing | - Surface water |
| - Aggregate or fill removal | - Trapping | diversions |
| - Landfills | - Hiking | - Stock tanks |
| - Sewage treatment | - Camping | - New utilities |
| - New roadways | - Mountain biking | - Grazing |
| - Groundwater pumping | - Woodcutting | - Archery/rifle range |
| - Hunting | - Horseback riding | - Public education |
| | - Picnicking | - Recreational residences |
| | - Skiing | - Commercial recreation services |

Potential/Known Biological Impact Areas and/or Activities

- The Sierra Vista Ranger District is managed for multiple uses, including timber, grazing, recreation, watershed protection, and wildlife habitat. Some uses are known to impact the flora and fauna. For instance, a multi-species Biological Opinion (AESO/SE 2-21-98-F-399) identifies grazing effects.

Priority Vulnerable Species (NOT VERIFIED)

- Mexican long-tongued bat (*Choeronycteris mexicana*)
- Allen's big-eared bat (*Idionycteris phyllotis*)
- Western red bat (*Lasiurus blossevillii*)
- Lesser long-nosed bat (*Leptonycteris curasoae yerbanbuena*)
- California leaf-nosed bat (*Macrotis californicus*)
- Pale Townsend's big-eared bat (*Plecotus townsendii pallescens*)
- Rufous-winged sparrow (*Aimophila carpalis*)
- Burrowing owl (*Athene cunicularia hypugaea*)
- Western yellow-billed cuckoo (*Coccyzus americanus ssp occidentalis*)
- Abert's towhee (*Pipilo aberti*)
- Giant spotted whiptail (*Cnemidophorus burti stictigrammus*)
- Ground snake (*Sonora semiannulata*)
- Western box turtle (*Terrapene ornata luteola*)
- Chiricahua leopard frog (*Rana chiricahuensis*)
- Lowland leopard frog (*Rana yavapaiensis*)

- Gila chub (*Gila intermedia*)
- Pima pineapple cactus (*Coryphantha scheeri var robustaspina*)
- Tumamoc globeberry (*Tumamoca macdougali*)

- Mountain lion (*Felis concolor*)
- Kit fox (*Vulpes macrotis*)
- Desert tortoise (*Gopherus agassizzi*)

Candidates for Species Reestablishment

- None known

Potentially Problematic Species

- Bullfrogs
- Crayfish
- Non-native fish

Baseline Information

- Detailed Vegetation Map: Not available; a generalized GIS vegetation type map is available, based on mapping at 1:62,500
- Flora/fauna Lists: AZ Game & Fish Heritage Database
- Water Inventory: Watercourses (streams and stock tanks) and water bodies (springs, windmills) available as ArcView themes, based on 1:24,000 mapping

GAP Status

Unreserved Coronado National Forest

- Status 3b

Management (Coronado National Forest Plan, 1986)

The mission, goals, and objectives for the Coronado National Forest are attained through applying groups of management practices and activities (prescriptions) to specific units of land (management areas). The Nogales Ranger District has 8 management areas within its boundaries. A brief description of the management areas is given below.

Management Area 1: Visual Resources and Semi-primitive Dispersed Recreation

Management Emphasis and Intensity: Manage for visual resources and semi-primitive dispersed recreation opportunities including those related to wildlife. Visual quality objectives will be met.

Management Area Description: These are steep, rugged lands with slopes greater than 40%. Generally have been determined incapable or unsuitable for sustained wood harvest and

livestock grazing. Includes all veg types except major riparian areas.

Management Area 4: Livestock Grazing (Level D), Game Habitat, and Fuelwood Harvest

Management Emphasis and Intensity: Managed to maintain and improve game habitat while sustaining harvest of livestock forage and fuelwood. Impacts on cultural resources and non-game wildlife habitats would be fully mitigated. Dispersed recreation activities may occur except for those that adversely affect the productivity of the land or resources. Watershed and soil conditions will be improved or maintained.

Management Area Description: Lands with average slopes under 40% that are capable and suitable to support fuelwood harvest, livestock grazing, and game habitat management. Includes desert scrub, grassland, chaparral, and woodland vegetative types.

Management Area 7: Unique Resources (including riparian areas)

Management area 7 has been given two different prescriptions due to the blending and indistinct differences between riparian vegetation types. Prescription A is intended for capability types 11AR (wet deciduous riparian) and 12R (wet coniferous riparian). Prescription B is intended for capability types 10R (dry desert riparian) and 11BR (dry oak riparian).

Prescription A

Management Emphasis and Intensity: Manage to perpetuate the unique wildlife or vegetative species. Improve and manage riparian areas to benefit riparian dependent resources. Dispersed recreation activities or other uses are allowed to the extent that they do not degrade the unique values. Facilities may be allowed and maintained for the purpose of protecting these resources. Visual quality objectives will be met.

Management Area Description: Undeveloped lands that have been identified as supporting flora and fauna associations that are unique enough to require special management practices. Includes identified riparian ecotypes. Includes deciduous and coniferous forest types. Includes known essential habitats for threatened and endangered species.

Prescription B

Management Emphasis and Intensity: Manage to perpetuate the unique wildlife or vegetative species while producing livestock forage and fuelwood on a sustained basis. Recreation activities and other uses may occur to the extent they do not degrade the unique values. Visual quality objectives will be met. Facilities may be allowed and maintained for the purpose of protecting these resources.

Management Area Description: Undeveloped lands that have been identified as supporting flora and fauna associations that are unique enough to require special management practices. Includes identified higher ecosystem extensions, such as oak and mesquite bottoms. Includes known, essential habitats for threatened and endangered species.

Restoration

No data available at this time.

Monitoring

The Forest Plan includes a monitoring plan to evaluate attainment of Plan goals, and to measure key administrative parameters. Monitoring elements include:

Recreation: Actual dispersed use in Recreation Opportunity Spectrum settings
Developed site use
Recreation use satisfaction
Condition of developed sites in the public sector

Wilderness: Wilderness use by Wilderness Opportunity Spectrum class

Visual Quality: The effect of management activities on acres of visual quality objectives

Wildlife: Population and habitat trends of management indicator species

Range: Actions to bring unsatisfactory ranges to satisfactory condition
Range condition and trend
New or revised range management plans
Range development
Permitted use
Grazing capacity

Soil & Water: Productivity and hydrologic functioning as represented by watershed condition ratings

Riparian Areas: Condition of riparian areas

Protection: Fire suppression effectiveness
Insure destructive insect and disease do not increase to damaging levels following management activities
Visibility in Class 1 Wilderness

Timber & Fuelwood: Insure acres are properly treated according to management prescription
Cords of fuelwood made available
Review maximum size limits of harvest areas to determine whether the limits should be continued
Adequate restocking of harvested lands
Re-evaluate unsuitable timber lands

Cultural Resources: Avoidance of damage to or loss of cultural resources by management activities.
Loss of, or damage to, cultural resources through weathering or vandalism

Costs: Unit costs

Total annual budget
Budget by program component

Standards & Guidelines: Plan implementation

Outputs: Management attainment report items

References

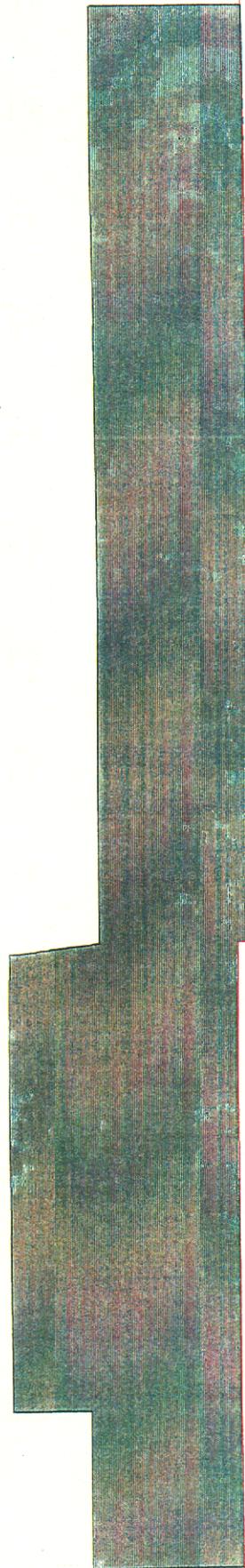
RECON. June 2000. *Priority Vulnerable Species: Data Compilation and Synthesis*. Pima County Administrator's Office.

Pima County. June 2000. *Issues of Non-native Species in Public Reserves*. Pima County Administrator's Office.

Kingsley, Ken. 2000. *DRAFT Potentially Problematic Species in Pima County*. Pima County Administrator's Office.

USDA Forest Service. 1986. *Coronado National Forest Plan*.

Whetstone EMA Within Pima County Sierra Vista Ranger District



 Pima County
 7,131 acres Whetstones, Forest Service



1:69169

Whetstone EMA
Within Pima County
Sierra Vista Ranger District



-  Pima County
-  Broadleaf Woodland
-  Desert Grassland
-  Evergreen Riparian



1:69169

Whetstones EMA Sierra Vista R. D. within Pima County	Vegetation Type	Acres
	Broadleaf Woodland	5,422
	Desert Grassland	993
	Evergreen Riparian	715
<i>Total Acres</i>		7,131

Coronado National Forest Research Natural Areas

Acreage

- Butterfly RNA 1,128 acres
- Santa Catalina RNA 880 acres

Reserve Document

- Butterfly RNA: Order of July 25, 1935
- Santa Catalina RNA Order of March 23, 1927 (first Research Natural Area)

Managing Entity

- USDA-Forest Service, Coronado National Forest, Santa Catalina Ranger District (both RNAs)

Activities Allowed

- Dispersed recreation (hiking)
- Maintenance or improvement of occupied habitat for TEP species (nonstructural habitat improvement projects)
- Maintenance or improvement of current populations of TEP species
- Watershed maintenance and improvement
- Maintain existing and necessary roads; close, drain and revegetate unneeded roads
- Fire suppression (confine, contain or control, as indicated by fire danger class)
- Use prescribed fire to permit lightning to play a natural role
- Insect & disease control, where there is a clear and imminent danger to resource values outside the RNA

Potential/Known Biological Impact Areas and/or Activities

- Grazing in Butterfly RNA (boundary is unfenced; Allotment Management Plan is undergoing NEPA analysis that will provide for enclosure).

Priority Vulnerable Species

- Unknown at this time. See the Priority Vulnerable Species for the Nogales and Santa Catalina Ranger Districts.

Potentially Problematic Species

- None known

GAP Status

• **Status 1a**

Monitoring

- Monitor watershed condition & trend. In addition to watershed monitoring, the Plan calls for monitoring of other parameters (wildlife population and habitat trends, range condition, soil and water condition, riparian condition, etc.) that may be relevant to RNA resource condition.

Research

Most research permits are issued Forest-wide, or in some cases, District-wide. Thus, it is difficult or impossible to determine the extent to which research is conducted in a specific RNA. The most common class of permits, Forest-wide, is for collection of insects. Collection of plants for herbaria or for instructional purposes is somewhat less common. Forest policy discourages collection within RNAs.

- *Butterfly RNA* is managed to provide opportunities for nondisruptive research and education. Use restrictions may be imposed to keep areas in their climax state. There is no harvest of forest products, including fuelwood.
- *Santa Catalina RNA* is managed for wilderness values and uses while providing opportunities for nondisruptive research and education. Use restrictions may be imposed to keep areas in their climax state. There is no harvest of forest products, including fuelwood. The only known permit specific to an RNA is for collection of tree-ring specimens in the Santa Catalina, to extend the dendrochronological record for southern Arizona.

Coronado National Forest Wilderness Areas

Acreage

- Rincon Wilderness 36,921 acres
- Pusch Ridge Wilderness 56,816 acres
- Mt. Wrightson Wilderness 3,928 acres

Managing Entity

- USDA-Forest Service, Coronado National Forest
- Nogales Ranger District (Mt. Wrightson Wilderness)
- Santa Catalina Ranger District (Pusch Ridge & Rincon Wildernesses)

Reserve Document

- 1988 Arizona-Idaho Conservation Act.

Allowed Activities

- Dispersed recreation (hiking, camping)
- Trail construction/reconstruction
- Grazing
- Maintain and improve habitat for TEP species, including structural improvements
- Watershed treatment, including channel stabilization using native or non-native species (the latter only in emergency situations where suitable native species are not available)
- Acquire private inholdings via land exchange
- Acquire rights-of-way for public access
- Prescribed fire
- Fire suppression
- Control insect and disease outbreaks that pose a clear and imminent danger to resource values outside of wilderness

Known/Potential Biological Impact Areas and/or Activities

- High visitor use may stress wildlife.

Priority Vulnerable Species

Mammals:

- Jaguar (*Panthera onca*)
- Jaguarundi (*Felis yagouaroundi tolteca*)
- Lesser long-nosed bat (*Leptonycteris curasoae yerbanbuena*)
- Mexican gray wolf (*Canis lupus baileyi*)
- Arizona shrew (*Sorex arizonae*)
- Southern pocket gopher (*Thomomys umbrinus intermedius*)
- Mexican long-tongued bat (*Choeronycteris mexicana*)
- California leaf-nosed bat (*Macrotus californicus*)
- Pale Townsend's big-eared bat (*Plecotus townsendii pallescens*)
- Arizona shrew (*Sorex arizonae*)—believed to be present, not necessarily confirmed

Birds:

- American peregrine falcon (*Falco peregrinus anatum*)
- Bald eagle (*Haliaeetus leucocephalus*)
- Cactus ferruginous pygmy owl (*Glaucidium brasilianum cactorum*)
- Masked bobwhite (*Colinus virginianus ridgwayi*)
- Mexican spotted owl (*Strix occidentalis lucida*)
- Northern aplomado falcon (*Falco femoralis septentrionalis*)
- Apache northern goshawk (*Accipiter gentiles apache*)
- Bell's vireo (*Vireo bellii*)
- Common black hawk (*Buteogallus anthracinus*)
- Northern gray hawk (*Asturina nitida maxima*)
- Western yellow-billed cuckoo (*Coccyzus americanus ssp occidentalis*)
- Swainson's hawk (*Buteo swainsoni*)

Reptiles:

- Sonoran desert tortoise (*Gopheris agassizi*)
- Arizona ridge-nosed rattlesnake (*Crotalus willardi willardi*)
- Giant spotted whiptail (*Cnemidophorus burti stictigrammus*)

Amphibians:

- Chiricahua leopard frog (*Rana chiricahuensis*)
- Lowland leopard frog (*Rana yavapaiensis*)

Insects:

- Arizona metalmark (*Calephelis arizonensis*)
- Aryxna giant skipper (*Agathymus aryxna*)
- Evansi brigadier (*Agathymus evansi*)
- False ameleus mayfly (*Ameletus falsus*)
- Mexican meadowfly (*Sympetrum signiferum*)
- Obsolete viceroy (*Limenitis archippus obsoleta*)
- Pima orange tip (*Anthocharis pima*)
- Poling's giant skipper (*Agathymus polingi*)
- Stephan's heterelmis riffle beetle (*Heterelmis stephani*)
- A tiger beetle (*Amblycheila baroni*)
- Ursine giant skipper (*Megathymus ursus*)

Plants:

- Pima pineapple cactus (*Coryphantha scheen var. robustispina*)
- Alamos deer vetch (*Lotus alamosanus*)
- Arid throne fleabane (*Erigeon arisolium*)
- Arizona giant sedge (*Carex ultra*)
- Arizona manihot (*Manihot davisiae*)
- Arizona monkshood (*Aconitum infectum*)
- Bartram stonecrop (*Graptopetalum bartramii*)
- Beardless chinch weed (*Pectis imberbis*)

- Box Canyon muhly (*Muhlenbergia dubiodes*)
- Branching penstemon (*Penstemon ramosus*)
- Broad leaf ground cherry (*Physalis latiphysa*)
- Chihuahuan sedge (*Carex chihuahuensis*)
- Chihuahuan stickseed (*Hackelia ursine*)
- Chiricahua rock cress (*Arabis tricomuta*)
- Chisos coral root (*Hexalectris revolute*)
- Foetid passion flower (*Passiflora foetida*)
- Gentry indigo bush (*Dalea tentaculoides*)
- Huachuca groundsel (*Senecio huachucanus*)
- Huachuca Mountain lupine (*Lupinus huachucanus*)
- Large-flowered blue star (*Amsonia grandiflora*)
- Lemmon lily (*Lilium parryi*)
- Lemmon milkweed (*Asclepia lemmonii*)
- Lemmon's lupine (*Lupinus lemmonii*)
- Lemmon's stevia (*Stevia lemmonii*)
- Lumholtz nightshade (*Solanum lumholtzianum*)
- Mexican broomspurge (*Euphorbia gracillima*)
- Mock pennyroyal (*Hedeoma dentatum*)
- Nodding blue-eyed grass (*Sisyrinchium cernuum*)
- Santa Cruz beehive cactus (*Coryphantha recurvata*)
- Santa Cruz star leaf (*Choisya mollis*)
- Santa Cruz striped agave (*Agave parviflora* spp *parviflora*)
- Seeman groundsel (*Senecio hartwegii*)
- Smooth ayenia (*Ayenia glabra*)
- Sonoran noseburn (*Tragia laciniata*)
- Superd beardtongue (*Penstemon superbus*)
- Supine bean (*Macroptilium supinum*)
- Sweet acacia (*Acacia smallii*)
- Thurber hoary pea (*Tephrosia thurberi*)
- Thurber's morning glory (*Ipomoea thurberi*)
- Trans-Pecos Indian paintbrush (*Castilleja nervata*)
- Tucson Mountain spiderling (*Boerhavia megaptera*)
- Virlet paspalum (*Paspalum verletii*)
- Wiggins milkweed vine (*Metastelma mexicanum*)
- Woolly fleabane (*Laennecia eriophylla*)

Potentially Problematic Species

- None known

Baseline Information

- Detailed Vegetation Map: None available; generalized vegetation type map available in ArcView GIS format (digitized at 1:250,000)
- Flora/Fauna Inventory: AZ Dept. of Game & Fish Heritage Database
- Water Inventory: Sixth-code watershed condition map, derived from 1:250,000 topographic data, is available. Water source inventory could be generated from available

cartographic feature files, with extensive manual addition of troughs and other range water developments.

Gap Status

- Rincon Wilderness: Status 1a
- Pusch Ridge Wilderness: Status 1b
- Mt. Wrightson Wilderness: Status 1b

Management

Management Area 8A: Research Natural Areas and Wilderness:

Management Emphasis and Intensity: Manage for wilderness values and uses while providing opportunities for nondisruptive research and education. Use restrictions will be imposed as necessary to keep areas in their climax state. There will be no harvest of forest products including fuelwood.

Management Area Descriptions: Includes those lands that have been determined to be suitable for both wilderness designation and designation as research natural areas. Includes Santa Catalina RNA.

Management Area 9: Wilderness

Management Emphasis and Intensity: Manage for wilderness values while providing livestock grazing and providing recreation opportunities that are compatible with maintaining wilderness values and protecting resources. Fire management emphasis will be to permit lightning caused fires to play, as clearly as possible, their natural ecological role within wilderness.

Management Area Description: Include all vegetative and land form types that have been determined to be suitable for wilderness designation. Includes the following areas: Pusch Ridge and Rincon Mountain Wilderness.

Monitoring

- The Forest Plan calls for monitoring of wilderness use by Wilderness Opportunity Spectrum Class. The method is a Visitor Use Report based on District Ranger estimates. Monitoring is conducted annually, and was to be reported in Plan years 3, 6, and 9. The actual use for a 5-year period is compared to projected use, by wilderness, and if use exceeds 30% of the total projected use, the need for a Plan modification will be considered. In addition to the use monitoring, the Plan calls for monitoring of other parameters (wildlife population and habitat trends, range condition, soil and water condition, riparian condition, etc.) that may be relevant to wilderness resource condition.

Research

- Most research permits are issued Forest-wide, or in some cases, District-wide. Thus, it is difficult or impossible to determine the extent to which a particular wilderness is subject to research. The most common class of permits, Forest-wide, is for collection of insects. Collection of

plants for herbaria or for instructional purposes is somewhat less common. The only known permit specific to a wilderness is for collection of tree-ring specimens in the Push Ridge Wilderness, to extend the dendrochronological record for southern Arizona.

Unreserved Coronado National Forest

Mission Statement

"Manage the resources of the Coronado National Forest under multiple use and sustained yield principles to provide for balanced contributions to the national welfare and to the economic and social needs of the people of southeast Arizona and southwest New Mexico. Management programs are to be oriented to maintain cultural values and a viable rural economy" (Coronado National Forest Management Plan).

Acreage

- 1,780,196 acres
- Total in Pima County: 379,955 acres including Research Natural Areas (RNAs) and Wilderness areas, but excluding private inholdings.
- 10,157 acres of private inholdings within the National Forest boundary.

Research Natural Areas

- Butterfly RNA 1,128 acres
- Santa Catalina RNA 880 acres

Wilderness

- Rincon Wilderness 36,921 acres
- Pusch Ridge Wilderness 56,816 acres
- Mt. Wrightson Wilderness 3,928 acres

Managing Document

- Coronado National Forest Land and Resource Management Plan, 1986

Activities Allowed

- | | | |
|-----------------------------|--------------------|----------------------------------|
| • Mining | • Fishing | • Surface water diversions |
| • Aggregate or fill removal | • Trapping | • Stock tanks |
| • Landfills | • Hiking | • New utilities |
| • Sewage treatment | • Camping | • Grazing |
| • New roadways | • Mountain biking | • Archery/rifle range |
| • Groundwater pumping | • Woodcutting | • Public education |
| • Hunting | • Horseback riding | • Recreational residences |
| | • Picnicking | • Commercial recreation services |
| | • Skiing | |

Known/Potential Biological Impact Areas and/or Activities

- The Coronado National Forest is managed for multiple uses, including timber, grazing, recreation, watershed protection, and wildlife habitat. Some uses are known

to impact the flora and fauna. For instance, a multi-species Biological Opinion (AESO/SE 2-21-98-F-399) identifies grazing effects.

Priority Vulnerable Species

Mammals:

- Jaguar (*Panthera onca*)
- Jaguarundi (*Felis yagouaroundi tolteca*)
- Lesser long-nosed bat (*Leptonycteris curasoae yerbanbuena*)
- Mexican gray wolf (*Canis lupus baileyi*)
- Arizona shrew (*Sorex arizonae*)
- Desert bighorn sheep (*Ovis canadensis mexicana*)
- Southern pocket gopher (*Thomomys umbrinus intermedius*)

Birds:

- American peregrine falcon (*Falco peregrinus anatum*)
- Bald eagle (*Haliaeetus leucocephalus*)
- Cactus ferruginous pygmy owl (*Glaucidium brasilianum cactorum*)
- Masked bobwhite (*Colinus virginianus ridgwayi*)
- Mexican spotted owl (*Strix occidentalis lucida*)
- Northern aplomado falcon (*Falco femoralis septentrionalis*)
- Apache northern goshawk (*Accipiter gentiles apache*)
- Bell's vireo (*Vireo bellii*)
- Common black hawk (*Buteogallus anthracinus*)
- Northern gray hawk (*Asturina nitida maxima*)
- Western yellow-billed cuckoo (*Coccyzus americanus ssp occidentalis*)

Reptiles:

- Sonoran desert tortoise (*Gopheris agassizii*)
- Arizona ridge-nosed rattlesnake (*Crotalus willardi willardi*)
- Giant spotted whiptail (*Cnemidophorus burti stictigrammus*)
- Mexican garter snake (*Thamnophis eques megalops*)

Amphibians:

- Chiricahua leopard frog (*Rana chiricahuensis*)
- Lowland leopard frog (*Rana yavapaiensis*)

Fishes:

- Gila topminnow (*Poeciliopsis occidentalis occidentalis*)
- Gila chub (*Gila intermedia*)

Insects:

- Arizona metalmark (*Calephelis arizonensis*)

- Aryxna giant skipper (*Agathymus aryxna*)
- Chiricahua white (*Neophasia terlootii*)
- Evansi brigadier (*Agathymus evansi*)
- False ameletus mayfly (*Ameletus falsus*)
- Mexican meadowfly (*Sympetrum signiferum*)
- Mountain silverspot butterfly (*Speyeria nokomis nitocris*)
- Obsolete viceroy (*Limenitis archippus obsoleta*)
- Pima orange tip (*Anthocharis pima*)
- Poling's giant skipper (*Agathymus polingi*)
- Sabino Canyon damselfly (*Argia sabino*)
- Stephan's heterelmis riffle beetle (*Heterelmis stephani*)
- A tiger beetle (*Amblycheila baroni*)
- Ursine giant skipper (*Megathymus ursus*)

Plants:

- Pima pineapple cactus (*Coryphantha scheen var. robustispina*)
- Alamos deer vetch (*Lotus alamosanus*)
- Aravaipa sage (*Salvia amissa*)
- Arid throne fleabane (*Erigeon arisolium*)
- Arizona alum root (*Heucheraa glomerulata*)
- Arizona giant sedge (*Carex ultra*)
- Arizona manihot (*Manihot davisiae*)
- Arizona monkshood (*Aconitum infectum*)
- Bartram stonecrop (*Graptopetalum bartramii*)
- Beardless chinch weed (*Pectis imberbis*)
- Bigelow thoroughwort (*Eupatorium bigelovii*)
- Box Canyon muhly (*Muhlenbergia dubiodes*)
- Branching penstemon (*Penstemon ramosus*)
- Broad leaf ground cherry (*Physalis latiphysa*)
- Catalina beardtongue (*Penstemon discolor*)
- Chihuahuan sedge (*Carex chihuahuensis*)
- Chihuahuan stickseed (*Hackelia ursine*)
- Chiricahua Mountain brookweed (*Samolus vagans*)
- Chiricahua rock cress (*Arabis tricomuta*)
- Chisos coral root (*Hexalectris revolute*)
- Counter-clockwise fishhook cactus (*Mammillaria mainiae*)
- Foetid passion flower (*Passiflora foetida*)
- Gentry indigo bush (*Dalea tentaculoides*)
- Goodding's onion (*Allium gooddingii*)
- Huachuca groundsel (*Senecio huachucanus*)
- Huachuca Mountain lupine (*Lupinus huachucanus*)
- Large-flowered blue star (*Amsonia grandiflora*)
- Lemmon lily (*Lilium parryi*)
- Lemmon milkweed (*Asclepia lemmonii*)
- Lemmon's lupine (*Lupinus lemmonii*)
- Lemmon's morning glory (*Ipomoea tenuiloba var. lemmonii*)
- Lemmon's stevia (*Stevia lemmonii*)
- Lumholtz nightshade (*Solanum lumholtzianum*)

- Mexican broomspurge (*Euphorbia gracillima*)
- Mock pennyroyal (*Hedeoma dentatum*)
- Nodding blue-eyed grass (*Sisyrinchium cernuum*)
- Pima Indian mallow (*Abutilon parishii*)
- Rusby hawkweed (*Hieracium rusbyi*)
- Santa Cruz beehive cactus (*Coryphantha recurvata*)
- Santa Cruz star leaf (*Choisya mollis*)
- Santa Cruz striped agave (*Agave parviflora* spp *parviflora*)
- Seeman groundsel (*Senecio hartwegii*)
- Shade violet (*Viola umbraticola*)
- Smooth ayenia (*Ayenia glabra*)
- Sonoran noseburn (*Tragia laciniata*)
- Sparseleaf hermannia (*Hermannia pauciflora*)
- Superd beardtongue (*Penstemon superbus*)
- Supine bean (*Macroptilum supinum*)
- Sweet acacia (*Acacia smallii*)
- Sycamore Canyon muhly (*Muhlenbergia xerophila*)
- Thurber hoary pea (*Tephrosia thurberi*)
- Thurber's morning glory (*Ipomoea thurberi*)
- Trans-Pecos Indian paintbrush (*Castilleja nervata*)
- Trelease agave (*Agave schottii* var. *treleasei*)
- Tucson Mountain spiderling (*Boerhavia megaptera*)
- Tumamoc globeberry (*Tumamoca macdougallii*)
- Virlet paspalum (*Paspalum verletii*)
- Wiggins milkweed vine (*Metastelma mexicanum*)
- Woolly fleabane (*Laennecia eriophylla*)

Candidates for Species Reestablishment

- Aplomado falcon
- Gila topminnow
- Sonoran chub
- Chiricahua leopard frog
- Ramsey Canyon leopard frog
- Mexican gray wolf (areas considered but dropped)

Potentially Problematic Species

- Tamarisk
- Buffel grass
- Red brome
- Mosquito fish
- Green sunfish
- Crayfish
- Sweet resinbush
- Pentzia
- Tree of Heaven

An incomplete list of non-indigenous plants is available in Appendix H of the report, Issues of Non-indigenous Species in Reserves, Pima County, Arizona.

Baseline Information

- *Detailed Vegetation Map:* Not available; a generalized GIS vegetation type map is available, based on mapping at 1:62,500
- *Plant Inventory:* AZ Game & Fish Dept. Heritage database
- *Animal Inventory:* AZ Game & Fish Dept. Heritage database
- *Water Inventory:* Watercourses (streams and stock tanks) and water bodies (springs, windmills) available as ArcView themes, based on 1:24,000 mapping

GAP Status

- *Unreserved Coronado National Forest*
Status 3b

In 1986, the USDA Forest Service approved an EIS for the Coronado National Forest Management Plan. The management plan is good for 15 years (from approval date in 1986), and will need to be updated and a new plan prepared at the end of the 15 years. The Forest Service anticipates issuing a Notice of Intent to prepare an EIS and Plan in Fiscal Year 2002 (10/1/2001-9/30/2002).

Management (Coronado National Forest Plan, 1986)

Goals

The Coronado National Forest Plan defined a goal as "a concise statement of the state or condition that a land and resource management plan is designed to achieve. A goal is usually not quantifiable and may not have a specific date for completion."

The Forest Plan has developed goals for 12 elements: recreation, wilderness, wildlife and fish, range, timber, water, minerals, and human and community development; and 4 support elements: lands, soils, facilities, and protection. A summary of goals for each element is listed below.

Recreation

- Maintain the current spectrum of developed, dispersed, and primitive recreation opportunities and increase those opportunities within resource capabilities.
- Manage, protect, and inventory cultural resources.
- Manage, protect, and inventory cave resources. Partnership with caving organizations, scientists, and outdoor recreationists.

Wilderness

- Manage existing wilderness to preserve and protect the wilderness character in

accordance with the various wilderness acts.

Wildlife and Fish

- Provide habitat for wildlife populations consistent with the goals outlined in the Arizona and New Mexico Game and Fish Departments' Comprehensive Plans and consistent with other resource values.
- Improve habitat of and the protection for local populations of threatened and endangered species to meet the goals of the Endangered Species Act.
- Provide ecosystem diversity by maintaining viable populations of all native and desirable nonnative wildlife, fish, and plant species through improved habitat management.

Range

- Eliminate grazing from areas not capable of supporting livestock without degrading natural resources.
- To restore rangeland to at least a moderately high ecological condition (70 to 75% of potential production) with stable soil and an upward trend.

Timber

- To continue a program that effectively utilizes the wood fiber produced, and enhances other resource values. Carry out silvicultural practices to improve stand health.

Soil and Water

- Secure and provide an adequate supply of water for the protection and management of the National Forest.
- Provide high quality water for off-Forest users by improving or maintain all watersheds to a high level.

Minerals

- Support environmental sound energy and minerals development and reclamation.

Human and Community Development

- Use human resource programs to meet the goals and objectives for resources and activities.

Lands

- Allow the use of available National Forest lands for appropriate public or private

interests consistent with National Forest policies.

- Obtain rights-of-way needed for resource management objectives.

Facilities

- Maintain all facilities to health and safety standards. Provide improvements to meet resource and activity needs.
- Provide transportation systems to meet land management and resource needs.
- Identify property lines.

Protection

- Protect life, property and resources from wildfire while using prescribed fire as a tool to meet management objectives.
- Manage resources to protect from pest insects and diseases.
- Cooperate with other Federal, state, and local agencies to protect air quality required by the Clean Air Act.

References

RECON. June 2000. *Priority Vulnerable Species: Data Compilation and Synthesis*. Pima County Administrator's Office.

Pima County. June 2000. *Issues of Non-native Species in Public Reserves*. Pima County Administrator's Office.

Kingsley, Ken. 2000. *DRAFT Potentially Problematic Species in Pima County*. Pima County Administrator's Office.

USDA Forest Service. 1986. *Coronado National Forest Plan*.

U.S. Bureau of Land Management

Baboquivari Wilderness

Coyote Mountains Wilderness

Ironwood National Monument

- Silverbell Mts. Resource Conservation Area (RCA)
- Waterman Mts. Area of Critical Environmental Concern
- Other BLM Lands

Las Cienegas National Conservation Area (pending)

- Empire Cienega RCA
-

**U.S. Bureau of Land Management Wilderness Areas
Coyote Mountain WA, Baboquivari Peak WA**

Size

Baboquivari Peak

- 2,079 acres

Coyote Mountain

- 5,103 acres

Reserve Document

- Public Law 101-628, Arizona Desert Wilderness Act of 1990

Activities Allowed

- Stock tanks (possibly)_
- Grazing *
- Hunting
- Fishing
- Hiking
- Climbing
- Camping
- Picnicking
- Horseback riding
- Bird watching
- Recreation

* A grazing lease is available on Coyote Mountain Wilderness. Currently, no cows are grazed. Baboquivari Wilderness is grazed.

Known/Potential Biological Impact Areas and/or Activities

- Climbing (cultural impact)
- Wildfire
- Trespassing livestock in Kearney bluestar habitat

Priority Vulnerable Species

- *Sonorella* species
- Kearney bluestar (Baboquivari)
- Mexican spotted owl (Baboquivari)
- Sonoran desert tortoise (Coyote)
- Jaguar (Baboquivari)
- Cactus ferruginous pygmy owl (Coyote)

Potentially Problematic Species

- Cattle grazing in and near the vicinity of the wilderness may provide a pathway for non-indigenous grasses.

Baseline Information

- *Detailed Vegetation Map:* The NRCS may have completed veg maps of this area. Walt Meyers is remapping this area.
- *Flora and Fauna Lists:* Unknown
- *Water Inventory:* Unknown
- Wilderness Study Inventory (Baboquivari and Coyote Wilderness): addresses biology, plants, etc. Management plans for both wildernesses are ongoing.
- Cultural Resources Survey for the Baboquivari Wilderness

GAP Status

- Status 1a

Both areas are administered by the BLM and are included under the *Proposed Phoenix Resource Management Plan and Final EIS*.

The Tohono O'odham Indians have submitted a draft bill to Congress requesting the transfer of Baboquivari Peak Wilderness to their ownership for religious purposes. The future of this draft bill is pending.

A draft management plan for the Coyote and Baboquivari Peak Wilderness is due sometime during 2001.

Monitoring

- The Kearney's Bluestar (*Amsonia kearneyana*) is monitored on the Baboquivari Mountains.
- Traffic counters have been set up in Baboquivari.

Restoration

- Wildlife water in Coyote Mountains.
- Removal of trespass cattle in Baboquivari.

References

Juen, Jesse. U.S. Bureau of Land Management. Personal communication 10/2000.

Ironwood National Monument

Size: 129,022 acres

Reserve Legislation

Executive Order -----signed by President Clinton, June 9, 2000.

Activities Allowed

- Grazing
- Hunting
- Recreation
- Mining (existing claims only)
- New utilities
- Stock tanks
- Mountain biking
- Ground water pumping
- Rights-of-way
- Vehicles limited to existing roads
- Public education
- Horseback riding
- Camping
- Bird watching
- Picnicking
- Hiking

Known/Potential Biological Impact Areas and/or Activities

- Off-road vehicle use still occurs within the Monument as an unauthorized use.
- Household and commercial trash dumping occurs throughout the monument.
- Incompatibility between jurisdictional management (primarily state lands, also private land uses).
- There is evidence of undocumented aliens using areas south of the Silverbell Mountains. Large deposits of trash are left behind.
- Cactus thief within the monument is a serious management concern.
- Cultural resource vandalism and theft.
- Multiple access points to the area--
- Activities contributing to biological stress in the surrounding Avra Valley include the

effects of agricultural use throughout the valley, groundwater pumping to support agricultural uses and residents of the Tucson Basin, and urbanization in the form of lot-splitting, subdivisions, and the roadways and infrastructure to support development (RECON, March 2000).

Priority Vulnerable Species

- Nichol Turk's Head Cactus (*Echinomastus horizonthalonius var nicholii*)
- Bighorn Sheep (*Ovis canadensis mexicana*)
- Lesser long-nosed bat (*Leptonycteris curasoae yerbabuena*)
- Pima pineapple cactus (*Coryphantha scheeri var robotispina*)
- Cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*)

- Sonoran desert tortoise

Potentially Problematic Species

- Green sunfish were present in ponds in the Asarco Silverbell Mine in the 1980's (Fonseca, April 2000).
- Agricultural and increased home building in the surrounding areas may provide pathways for non-native species.
- Red brome, fountain grass, and buffel grass are known and a problem on the adjacent Saguaro National Park lands in similar habitat to the Monument.

Baseline Information

- *Detailed Vegetation Map:* Partial ecosite map
- *Flora/Fauna Lists:* Not comprehensive
- *Water Inventory:* ??

The Desert Museum is a source of much data, but not all has been reviewed and evaluated.

GAP Status

- GAP Status 2

The Presidential Proclamation of June 9, 2000 declared that the land in the newly created monument withdrawn from all forms of mineral and geothermal entry. Any off-road mechanized or motorized travel is prohibited. The proclamation stated, "All Federal lands and interests in lands within this monument are hereby appropriated and withdrawn from all forms of entry, location, selection, sale, or leasing or other disposition under the public land laws, including but not limited to withdrawal from location, entry, and patent under the mining laws, and from disposition under all laws relating to mineral and geothermal leasing, other than by exchange that furthers the protective purposes of the monument."

The monument is subject to all rights valid at the time of its establishment. This includes, but is not limited to, mining, and rights-of-way. The monument proclamation only affects federal lands within the monument designations. Within the boundaries of the monument, there are 6011 acres of private land and 54653 acres of State land. In the absence of federal acquisition, these lands will follow the laws applicable to state and county laws.

The Ironwood Monument includes the Waterman Mountains Area of Critical Environmental Concern, and the Silverbell Resource Conservation Area, two areas previously designated under the BLM's Phoenix Area Resource Management Plan (1988), because of their unique ecological and biological characteristics. The RCA and ACEC designations will remain in place during the interim management of the monument. Other designations in place within the Monument include the Silverbell Bighorn Sheep Special Management Area (SMA), Avra Valley SMA, Santa Ana Chiqui Buritac SMA, the Aqua Blanco Ranch SMA, and the Cocoraque Butte-Waterman Mountain SMA.

Monitoring

BLM monitoring projects at the monument include the Nichol Turk's head cactus and the Sonoran desert tortoise (Simms, pers.comm).

Restoration (Simms, pers.comm.)

Restoration that has occurred on the monument include revegetating mine areas. Roads have been closed on the upper part of Ragged Top Mountain. Vegetation monitoring occurs in several plots throughout the monument. Many years ago, reseeding projects occurred to improve the rangeland. Monitoring plots were set up for the Tumamoc globeberry, when the plant was considered an endangered species.

References

RECON. June 2000. Priority Vulnerable Species: Data Compilation and Synthesis. Pima County Administrator's Office.

RECON. March 2000. Biological Stress Assessment. Pima County Administrator's Office.

Fonseca, Julia. April 2000. *Cocio Wash and the Gila Topminnow*. Pima County Administrator's Office.

Simms, Karen. Wildlife Biologist: USDI Bureau of Land Management. Personal communication, October 3, 2000.

Empire-Cienega Resource Conservation Area

Size

- 49,000 acres
- Total in Pima County: 31,906 acres

Ownership/Managing Entity

- In 1988, a series of land exchanges with the Anamax Mining Company brought the land into public ownership under the administration of the USDI Bureau of Land Management.

Reserve Document

- None

Activities Allowed

- Limited Mining (few 100 acres in Empire Mnt.)
- Grazing
- Groundwater pumping
- New utilities
- Stock tank
- Aggregate/fill removal (only for BLM use)
- Hunting
- Hiking
- Mountain biking
- Picnicking
- Public education
- Horseback riding
- Camping
- Bird watching

Known/Potential Biological Impact Areas and/or Activities

- Incompatibility of jurisdictional management (adjacency with state lands)—grazing issues with no fence between BLM and State lands.
- Activities contributing to biological stress in the surrounding Empire-Cienega valley include the effects of groundwater pumping to support residents, and urbanization in the form of lot-splitting, subdivisions, and the roadways and infrastructure to support development (RECON, March 2000).
- Illegal immigrants crossing through the Empire-Cienega leave behind large amounts of trash and human waste. There have been some problems with vehicle abandonment in an area referred to as 'The Narrows' along Cienega Creek.
- General use of some areas of the RCA needs to be addressed. In one camp ground,

oak tree canopies are scorched from campfires, and the soil around the roots of the trees is compacted due to vehicles parking under the tree canopy.

There are several other group use sites that have impacts associated with use that do not present detrimental resource impacts (Simms, pers.comm).

- A new roadway segment is proposed to replace an existing, poorly designed road. The existing road would be allowed to convert to natural cover.

Priority Vulnerable Species

- Mexican long-tongues bat (*Choeronycteris mexicana*)
- Lesser long-nosed bat (*Leptonycteris curasoae yerbabuena*)
- Western red bat (*Lasiurus*)
- Southern yellow bat (*Lasiurus xanthinus*)
- Rufous-winged sparrow (*Aimophila carpalis*)
- Western yellow-billed cuckoo (*Coccyzus americanus ssp occidentalis*)
- Abert's towhee (*Pipilo aberti*)
- Southwestern willow flycatcher (habitat only)
- Desert box turtle (*Terrapene ornata luteola*)
- Mexican garter snake (*Thamnophis eques megalops*)
- Chiricahua leopard frog (*Rana chiricahuensis*)
- Longfin dace (*Agosia chrysogaster*)
- Gila chub (*Gila intermedia*)
- Gila topminnow (*Poeciliopsis occidentalis occidentalis*)

Potential Problematic Species

- Bullfrog
- Tamarisk
- Lehmann's lovegrass
- Mesquite and other shrubby species (burroweed)
- Cowbirds

BLM staff has attempted bullfrog eradication. Bullfrog numbers are still small enough to successfully control. Staff is planning to attempt control areas with small-sized tamarisk (Simms, pers.comm).

Baseline Species

- *Detailed Vegetation Map:* Ecological sites have been mapped into the BLM's GIS system. Riparian areas mapped. ESI mapping soils and vegetation descriptions of potential "ideal."
- *Flora/Fauna Lists:* Bird, mammal, herptofauna, and partial flora lists
- *Water Inventory:* Stock ponds survey and water rights inventory; have initialized stream gauge with USGS.

U.S. National Park Service

Saguaro National Park

- Rincon District & Wilderness Area
- Tucson Mountain District & Wilderness Area

Organ Pipe Cactus National Monument

GAP Status

- **Status 3b**

This land is protected from residential development, but due to the 1872 Mining Act, mining is permitted on public lands. This affects only a small area in the Empire Mountains, the rest of the RCA is withdrawn from mining. The BLM lands also allow grazing, a practice which may degrade the natural quality of the land.

A draft management plan for the Empire Cienega RCA is due out in the fall of 2000. Depending on the final management practices and level of protection, the Empire-Cienega RCA may be moved to a GAP status of 1 or 2.

The Las Cienegas National Conservation Area bill has been passed by Congress and is awaiting presidential approval. The NCA would engulf the Empire-Cienega RCA. The establishment of the Las Cienegas NCA would give the Empire-Cienega RCA permanent legislative protection, thereby increasing the GAP status of the reserve. The NCA would not eliminate the mining threat in the Empire Mountains because it would preserve existing rights.

Monitoring (Simms, pers.comm)

Riparian vegetation, upland vegetation, fish habitat, endangered species, and stream flow are monitored.

Restoration

- Restoration efforts have occurred along Empire Gulch, where it was fenced off to cattle, cabled off to vehicles, and the bank planted with trees.
- Extensive restoration efforts have occurred along Cienega Creek. A major head cut was repaired and a diversion canal capped.
- Stabilization work is an ongoing processes at the historic Empire Ranch complex.

References

RECON. June 2000. Priority Vulnerable Species: Data Compilation and Synthesis. Pima County Administrator's Office.

RECON. March 2000. Biological Stress Assessment. Pima County Administrator's Office.

Pima County. June 2000. Issues of Non-native Species in Public Reserves. Pima County Administrator's Office.

Simms, Karen. Wildlife Biologist; USDI Bureau of Land Management. Personal communication, October 3, 2000.

Saguaro National Park

Size

Rincon District

- Saguaro National Park: 8,804 acres
- SNP Wilderness Area: 58,581 acres

Tucson Mountain District

- Saguaro National Park: 10,433 acres
- SNP Wilderness Area: 12,992 acres

Reserve Document

- Saguaro National Park Establishment Act of 1994 -- Public Law No. 103-364
- 1976 Act of Congress--Public Law No. 94-567

Rincon District

- Presidential Proclamation No. 2032

Tucson Mountain District

- Presidential Proclamation No. 3439

Wilderness

- designated by Congress in 1976 (PL 94-578)

Activities Allowed

- Hiking
- Picnicking
- Mountain biking
- Camping
- Public education

Known/Potentially Biological Impact Areas and/or Activities

- Several areas in the park suffer from invasive species, such as buffelgrass and fountain grass. The urban boundaries are approaching the park boundaries--feral cats and dogs may be a problem inside the park.
- The Cactus Forest area (Rincon Mountain District) is heavily criss-crossed with social trails (Kline, pers.comm).
- Expansion lands in both districts are impacted with social trails. About 1000 acres in the Rincon District is heavily impacted by past grazing, roads, and social trails (Kline, pers.comm).

- Mines sites, particularly in the Tucson Mountain District, have a heavy "footprint."
(Kline, pers.comm)

Priority Vulnerable Species

- Mexican long-tongued bat (*Choeronycteris mexicana*)
- Allen's big-eared bat (*Idionycteris phyllotis* (possible occurrence))
- Western red bat (*Lasiurus blossevillii* (possible occurrence))
- Lesser long-nosed bat (*Leptonycteris curasoae yerbanbuena*)
- Pale Townsend's big-eared bat (*Plecotus townsendii pallescens*)
- Rufous-winged sparrow (*Aimophila carpalis*)
- Burrowing owl (*Athene cunicularia hypugaea* (rare transient))
- Western yellow-billed cuckoo (*Coccyzus americanus ssp occidentalis* (rare transient))
- Abert's towhee (*Pipilo aberti*)
- Bell's vireo (*Vireo bellii*)
- Tucson shovel-nosed snake (*Chionactis occipitalis klauberi*)
- Ground snake (valley form) (*Sonora semiannulata*)
- Lowland leopard (*Rana yavapaiensis*)
- Tumamoc globeberry (*Tumamoca macdougalii*)
- Desert tortoise (*Gopherus agassizii*)
- Mountain lion (*Felis concolor*)

Potentially Problematic Species

- Buffelgrass
- Fountain grass

Saguaro National Park staff have been surveying and mapping non-native species in the park since 1997. Volunteer groups have been surveying and mapping non-native plants since the fall of 1998. Plans to control and manage these species include a five-person crew to work on hand pulling and other control methods, and a buffelgrass research project with funding available through 2001-2003. A more complete listing of non-indigenous plants is available in Appendix D in *Issue of Non-native Species in Public Reserves*, July 2000.

Baseline Information

- *Detailed Vegetation Map:* Tucson Mountain District and lower portion of the Rincon District mapped in the 1990's. Rincon District mapped in the 1920's; lower desert scrub accurate, upper montane inaccurate due to fire disturbances over the years.
- *Flora Inventory:* Floral lists available
- *Fauna Inventory:* Fauna lists
- *Water Inventory:* Effort to find and map water sources occurring.

GAP Status

Saguaro National Park (Rincon and Tucson Mountain Districts)

- Status 1b

Saguaro National Park is permanently protected and has a mandated management plan. Both areas outside of the wilderness are heavily visited and have visitor centers.

SNP Wilderness

- Status 1a

On October 20, 1976 (Public Law 94-567) designated 71,400 acres in Saguaro National Park as wilderness. Management of this portion of the park must comply with provisions of the Wilderness Act (P.L. 88-577).

Management (Environmental Assessment General Management Plan, 1987)

SNP East and West are broken into four different management zones: the natural zone, development zone, historic zone, and special use zone.

- The natural zone includes the majority of park lands. Management emphasis is on the conservation of natural resources and processes.
- The development zone encompasses small areas around areas of heavy visitor use and management facilities. The zone includes areas that have been heavily altered from the natural environment.
- The historic zone applies to site-specific areas and may overlap in another type of zone.
- The special use zone are areas within the boundaries of the park, but are owned or managed by other agencies or private interests.

Land Ownership and Use (SNP Land Protection Plan, 1993)

There are 13 private tracts within the authorized boundary of Saguaro National Park:

- The Phillips Road easement crosses a portion of the Tucson Mountain District. SNP closed this road in 1987. Negotiations between Phillips and the Park Service for the taking of the road arise from time to time.
- The 160-acre Harvey property is located on the eastern property of the Tucson Mountain District. This tract is undeveloped and there are no plans for its use.

Eleven tracts are located in the recently expanded Rincon Mountain District boundary.

- Rocking K Ranch (1945.20 acres): This property has approved zoning for varied density residential and resort site development.

- **Jackson Family Trust (1383.0 acres):** This property is undeveloped with an approved suburban ranch zoning density of one house per 3.3 acres. The owners would like to sell the entire tract, and development is possible. This property is a critical link between the Madrona Trailhead and the Rocking K Ranch for visitor access to the southern portion of the park.

This property contains significant riparian habitat, with an abundance of mature native trees. The tract also includes an unoccupied 4,000 square foot X9 main ranch house, as well as other buildings. The X9 working ranch is also included in this tract, with a foreman's house and other ranching structures associated with the cattle operations on the X9. The main and working ranch are listed for sale, and includes several thousand acres of grazing leases.

- **The X9 Ranch Trust (168.04 acres):** This is an undeveloped tract linking the Jackson Family Trust lands and State Trust lands along the southern portion of the authorized SNP boundary. The tract contains an undeveloped portion of Rincon Creek.
- **Carroll (40.33 acres):** This parcel was purchased with deed restrictions of the X9 Ranch Owners Association. The owner plans to construct one home, consistent with the deed restrictions.
- **Hufault (45.49 acres):** Presently undeveloped, this tract lies along Chiminea Creek directly south of the Carroll property. It was sold under the same circumstances as the Carroll property. The owner plans on building one house, consistent with deed restrictions.
- **Rosen/Katz (20.52 acres):** This is one of three undeveloped tracts within the Rocking K lands. The owner is selling to the United States.
- **Coffman (20.53 acres):** This is one of three undeveloped tracts within the Rocking K lands. It is in prime saguaro/palo verde area and within the viewshed of any trail leading from Camino Loma Alta.
- **Leshner/Kimble (40.3 acres):** This is one of three undeveloped tracts within the Rocking K lands. This parcel adjoins the Coffman tract, and has similar resource values. The owner is awaiting appropriated funds for sale to the United States.
- **Crable (9.77 acres):** This tract is surrounded by the X9 Ranch Trust tract. It contains high quality riparian habitat associated with Rincon Creek. The owner has no immediate plans for development.
- **Hilliard Living Trust (45.95 acres):** This tract is south of Carroll and Hufault tracts and is located along Chiminea Creek. The owner indicates no intent to develop in the near future.
- **Hilliard (40.03 acres):** This parcel is south of the Hilliard Living Trust tract along

Chimineia Creek. The owner has no plans for development.

Pima County (58.26 acres) and the State (1320.29 acres) own parcels in the Tucson Mountain District. There are no non-park uses, and no plans for changing uses on these lands. The tracts are located in the Natural Zone and are managed on preservation of the natural processes and scenic qualities.

In the Rincon Mountain District, the State owns 358.94 acres. 40 acres are included in the Rocking K Specific Plan and are planned for development. The remainder is under grazing lease to the X9 Ranch.

Management Concerns (Statement for Management, 1995)

Picture Rocks Road, which bisects the Tucson Mountain District, experiences increasing commuter traffic due to the growth in Avra Valley. The General Management Plan provides for closure of the road, although this action will not occur unless Pima County constructs an alternate route.

Legislation authorized expansion of the Rincon Mountain District by 4111 acres in 1991, and expansion of the Tucson Mountain District by 3460 acres in 1994. Privately owned lands authorized for acquisition by these two laws were valued at \$45,000,000. Almost \$18,000,000 has been spent in purchasing the Rocking K Ranch. In the spring of 1995, a land exchange valued at \$4,000,000 was completed. A total of \$23 million has been spent (April 1999), with over 90% of the Rincon Mountain expansion acquired, and 25% of the Tucson Mountain District areas acquired. On a number of the remaining tracts of privately owned lands contained within the authorized expansion boundaries, development is imminent.

Utility Systems

The sewage systems are septic tank and leach field type, though there are plans and funding that would provide City water to the Rincon Mountain District headquarters complex by 1997.

Both Districts obtain their water from National Park Service wells. At the Rincon Mountain District the two wells are 500 feet deep with four miles of distribution line, a 100,000 gallon reservoir and pumping station. The system is pressurized, with emergency fire pumps and backup pump. The Tucson Mountain District has one well over 560 feet in depth, six miles of distribution line and a 50,000 gallon reservoir delivering water to Red Hills through gravity flow. In 1990, a solar powered pump, chlorination and filtration system was installed at Manning Camp. A 2000 gallon water tank treats and transports water through a gravity flow system.

Water for the Madrona Ranger Station is purchased from a nearby private water company. The water is hauled in 500 gallon loads over a primitive dirt road and stored in a 10,000 gallon tank. This system is expensive to operate and provides limited domestic service.

A single radio system serves both districts. The electrical utility systems at the Rincon Mountain District is provided by Tucson Electric Power. The Tucson Mountain District is

serviced by Trico Electric Company.

Management Objectives (Statement for Management, 1995)

Natural Resources

- To restore and/or maintain natural ecosystems so as to allow natural processes to continue to the fullest extent possible.

Cultural Resources

- To identify, evaluate, protect and preserve the park's cultural resources in accordance with legislative and executive requirements and the Service's historic preservation and curatorial policies.

Visitor Use

- To provide opportunities for recreational use of the park consistent with the obligation to protect and perpetuate natural and cultural resources.

Maintenance

- Provide for the construction, maintenance, and operation of the Park's "built environment." Provide high quality physical facilities in a manner which is consistent with NPS resource protection principles.

Interpretation

- To foster public understanding and appreciation of natural processes within each of the desert-to-mountain life zones contained within the park. Emphasize the importance of individual decision-making to preserve our delicate environment on local, regional, national and global levels.

Research Programs and Acquisition of Information

- To secure adequate research data and other information necessary for proper and informed management and accurate interpretation of the park's natural and cultural resources.

Visitor and Employee Protection and Safety

- To provide year-round visitor protection and services at levels appropriate to the intensity and types of visitor activities.

Cooperation

To cooperate with other agencies, private organizations and members of the public to promote

use in the park and use and development of lands in its vicinity in a manner that minimizes and/or mitigates adverse effects on esthetics and the quality of park resources.

Land Protection

- To develop and implement land protection strategies that will ensure preservation of resources on Federal, state, county, and privately owned lands within the authorized boundaries of the park.

Research

Monitoring

References

USDI National Park Service. 1995. Statement for Management: Saguaro National Park.

USDI National Park Service. 1993. Land Protection Plan: Saguaro National Monument.

USDI National Park Service. 1999. Environmental Assessment for Use and Management of the Saguaro National Park Expansion Areas. A General Management Plan Amendment.

USDI National Park Service. 1987. DRAFT Environmental Assessment General Management Plan: Saguaro National Monument.

RECON. June 2000. Priority Vulnerable Species: Data Compilation and Synthesis. Pima County Administrator's Office.

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Kline, Natasha. Wildlife Biologist; Saguaro National Park. Personal communication, October 3, 2000.

Organ Pipe Cactus National Monument

Legislative Mandates

The Organ Pipe Cactus National Monument is managed under the 1916 Organic Act. The legislation was enacted to "conserve the scenery and the natural and historic objects and wild life therein and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations."

Size

Wilderness Area: 313,840 acres
National Monument: 14,616 acres

Reserve Document

Organ Pipe National Monument

- Presidential Proclamation 2232

Wilderness Area

- 1964 Wilderness Act

Activities Allowed

Organ Pipe National Monument

- Camping
- Hiking
- Mountain biking
- Picnicking
- Public education

Wilderness Area

- Camping
- Hiking

Cultural Resources Overlay Zone

- Hiking
- Public education

Known/Potential Biological Impact Areas and/or Activities

- Large numbers of illegal immigrants are traveling throughout the monument, including the wilderness, leaving behind enormous amounts of trash and human waste. New trails are created, woodcutting for fires occurs, and large campsite disturbances are left behind. (Rutman, pers.comm)
- Wildlife (especially reptiles) near Highway 85 may encounter death.
- Quitobaquito Springs and Pond have developed many 'social' trails.
- Cactus ferruginous pygmy owl may be affected by the proposed Alamo Canyon Campground expansion.

Priority Vulnerable Species

- Lesser long-nosed bat (*Leptonycteris curasoae yerbanbuena*)
- Mexican long-tongued bat (*Choeronycteris mexicana*)
- California leaf-nosed bat (*Macrotis californicus*)
- Merriam's mesquite mouse (*Plecotus merriami*)
- Pale Townsend's big-eared bat (*Plecotus townsendii pallescens*)
- Cactus ferruginous pygmy owl (*Glaucidium brasillianum cactorum*)
- Abert's towhee (*Pipilo aberti*)
- Bell's vireo (*Vireo bellii*)
- Tucson shovel-nosed snake (*Chionactis occipitalis klauberi*)
- Organ pipe shovel nosed snake (*Chionactis occipitalis organica*)
- Ground snake (valley form) (*Sonora semiannulata*)
- Red-backed whiptail (*Cnemidophorus burti xanthonotus*)
- Acuna cactus (*Echinomastus erectocentrus var acunensis*)
- Tumamoc globeberry (*Tumamoca macdougalii*)

Potentially Problematic Species

- Buffelgrass

A more complete list of non-indigenous plants is present in Appendix A of *Issues of Non-native Species.....*

Baseline Information

- *Detailed Vegetation Map:* Yes; digitized and the County has it.
- *Flora/fauna Inventory:* Yes; plant, mammal, herptofauna lists available.
- *Water Inventory:* Yes; 11 springs have been documented in OPCNM, 7 of them are located in Quitobaquito where spring flows and quality have been documented.

GAP Status

Organ Pipe National Monument

- Status 2

State Route 85 runs through approximately 22 miles of the monument. The road experiences high speed traffic and is responsible for wildlife road-kill. The road also presents a barrier to wildlife movement. An alternative management action calls for the translocation of current power-lines. The power-lines would be removed from their current location and buried underground, following State Route 85. Part of the monument is developed or is planned for development. Development plans include new facilities related to employee, research, and visitor use.

Wilderness Area

- Status 1a

Cultural Resources Zone:

- Status 1a

Management (Organ Pipe Cactus Final General Monument Plan, 1997)

The OPCNM has been designated by UNESCO as a Biosphere Reserve, which gives the monument international significance. The Organ Pipe Cactus National Monument Management Plan will function as the biosphere reserve plan. The NPS will continue to participate and further the function of Biosphere-related activities.

One objective of the management plan is to redesignate the status of the Organ Pipe Cactus National Monument to the Sonoran Desert National Park. Management states that the designation of a National Park would be more suitable for the multiple resources that the monument protects.

Land Use and Management

- Wilderness Zones: the land in this zone would be preserved in accordance with the regulations in the Wilderness Act. Two subzones are included in the area: the Potential Wilderness Subzone; and the Quitobaquito Management Area Subzone. The potential wilderness subzone includes 3,410 acres of land eligible for a wilderness designation.

Within the Quitobaquito Management Area Subzone, the parking lot would be relocated to Puerto Blanco road, allowing the Quitobaquito Rod to be converted to a handicapped accessible trail. If recommended by Congress, this action would add 23 acres to the wilderness status. 1280 acres of state held land would be designated wilderness and managed by the NPS as such.

- Non-Wilderness Zones: the land in this zone would provide for uses involving large concentrations of people and vehicles. Included within this zone are three subzones: State Route 85 Corridor Subzone; the Travel Corridor Subzone, which includes all other roads; and the Development Subzone, which applies to management facilities and visitor concentration areas. Additional development would be confined to already developed areas.
- Cultural Resources Overlay Zone: land in this zone has historical and other cultural resources existing on it. Land would be preserved, protected, and interpreted based on the cultural resources existing there.

Natural and Cultural Resource Management

Issues which have been identified in this area include the need for a comprehensive resources management program, mitigation strategies and species recovery plans, and increased efforts to preserve air, water, cultural, and other resources. These goals could be accomplished through an interagency effort including the NPS, USFWS, BLM, and state management agencies.

- Resources Management Facilities: The existing facility at Twin Peaks would be converted to a 5,000 sq.ft. Science, Education, and Resources Management Center. A greenhouse and plant nursery would be constructed nearby. These facilities would serve to educate the public and provide work space for monument personnel and visiting researchers. Existing offices would be converted back to employee homes.
- Cultural Resources: Appropriate historic properties would be stabilized, and where appropriate, listed on the National Register of Historic Places. Preservation and use treatments would apply to those listed properties. New construction would be surveyed for archaeological resources and potential impacts mitigated.

The Natural and Cultural Resources Management Plan calls for actions that would

significantly increase the knowledge and understanding of known and currently unknown cultural resources and properties. Traditional cultural properties will be evaluated for potential eligibility for listing on the National Register of Historic Places.

- **Native American Consultation:** The NPS seeks a government to government agreement about the management of the monument lands, particularly those that may be sacred to the Tohono O'odham. The United States would be represented by the Superintendent or other representative from the NPS. The NPS would attempt to ensure greater involvement of the O'odham in interpretive activities, including cultural history.
- **Special Status Species:** The monument staff has current monitoring programs for the known threatened and endangered species within the monument. These will continue at the present level, and may increase in scope with the addition of appropriate staff.

Sonoran Pronghorn: Traffic along Highway 85 acts as a barrier to movement and fragments the species habitat. The NPS will work with ADOT to explore measures needed to reduce impacts of traffic speed and volume along State Route 85. The NPS will also continue serve as a member of the Sonoran Pronghorn Core Working Group and implement the Recovery Plan; will modify fences along the monument border for pronghorn passage; will educate motorists about the vulnerability of the species to traffic; and will monitor and restrict human use and access where necessary to minimize potential disturbance to the animal.

Lesser long-nosed bat: The NPS will monitor the roost near the Alamo Wash campground for presence and abundance of bats, as well as for unauthorized human disturbance; will maintain existing structures to prevent unauthorized human disturbance; and will not install bat gates until appropriate to do so.

Quitobaquito Desert Pupfish: The proposals made by the NPS will not adversely affect the habitat of this animal. A well defined trail system at Quitobaquito will reduce visitor trampling and improve habitat for the pupfish.

Cactus Ferruginous Pygmy-Owl: The NPS will research the effect of human presence and development before building 4 proposed campsites in the Alamo Canyon Wash area. The NPS will cooperate with the USFWS to establish closures in areas where pygmy-owls are detected; and will work on public awareness of the vulnerability of this species.

- **Air Quality Resources:** If the state of Arizona redesignates the monument from Class II to Class I via the State Implementation Plan for Air Quality, maximum protection of the monument's air quality could be achieved.
- **Visual Resources:** To ensure the preservation of visual resources, actions would be taken to develop suitable guidelines for all new developments within the monument. An attempt to move and bury existing power lines would be made. NPS will try to offset the costs associated with this project, and coordinate this project with the concurrent disturbance associated with planned building or improvement.

Visitor Use and Associated Facilities

The Organ Pipe Cactus National Monument is in the center of the Sonoran Desert, and is surrounded by Cabeza Prieta National Wildlife Refuge, the Tohono O'odham Nation, and Sonoyta Valley in Mexico. Because of the location of the monument, and the mandates of the NPS, the monument has some responsibility to provide leadership for the preservation, education, and maintenance of the area. Visitor education would include interpretive programs, environmental awareness education, regional cooperation, biosphere goals, and history of the people and their relationship with the land.

Informational portals would be created along State Route 85. The portals will consist of a picnic table, shade, and some signs with interpretive material on them. Interpretive facilities would also be built in cooperation with other agencies, with one located in Why, Arizona. Other facilities could consist of pullouts with informative signs or mutually agreeable programs or facilities. The NPS would also cooperate with the International Sonoran Desert Alliance to establish a tri-national, tricultural center in Lukeville.

- Camping: The Twin Peaks campground would remain. Primitive camping would be increased with 20 new walk-in campsites up-canyon from the existing Twin Peaks area. Parking would be expanded. A feasibility study would be done to determine if the Alamo Canyon campground could be expanded without affecting endangered species, particularly the cactus ferruginous pygmy owl. Day use parking for six vehicles would be designated within the existing loop drive.
- Roads and Trails: The existing road network would be retained, with the exception of some realignment of roads in the Twin Peaks area. 800 feet of new road would be constructed, with a corresponding length of road removed and restored. 400 feet of a new turn-around would be constructed at the entrance to Puerto Blanco Drive.

8 new trails would be added (8.9 miles), with 5.5 miles handicapped accessible. Two new hiking routes (13.5 miles) would be marked on maps only, and remain undeveloped and unmaintained. Most of the new trails are social trails which have already been carved out by common use. Officially designating these trails would contribute to managing visitor use so that no additional disturbance would occur. Signs would be added to the hiking routes and trails to enhance interpretation and education, and to allow visitors access to existing resources.
- State Route 85: This road runs through about 22 miles of the monument. Emphasis for this road would be to develop a program with Arizona Department of Transportation, Arizona Game and Fish, U.S. Fish and Wildlife, and others for the following 3 objectives: 1) gather data on the extent of traffic impacts on wildlife, vegetation, cultural resources, human safety and visitor experience; 2) explore and implement measures to reduce impacts on monument resources while accommodating traffic; 3) establish a program to promote public support and compliance.
- Quitobaquito: When making any decisions about the Quitobaquito area, the NPS would confer with the Tohono O'odham. Current plans are to move the parking area, convert the existing road to a handicap accessible trail, and formalize social trail so that further erosion will be prevented. A study would be developed to determine if use limits would protect endangered wildlife in the area.

Park Operations and Associated Facilities

Financial considerations must be considered in the maintenance of facilities and land in the monument. The NPS would consider seeking alternative funding or partnerships for staffing, and continue to rely on volunteers. OPCNM currently (at the time of publishing) has 27 full

time employees with an operating budget (1994) of \$1,127,000. The plan proposes adding 1 full time staff member per year for the next fifteen years to accommodate for increased visitation. The plan would seek partnership for 2000 feet of office space in the Lukeville Customs and Immigration Reserve. The maintenance area near Twin Peaks would be expanded by 2000 square feet for work space, shops, and office space. A 4000 square foot ranger operations and a fire station with a helicopter pad would be constructed at the Twin Peaks area also.

- Seasonal Needs: Affordable, short-term housing is needed at the monument. The NPS will have to build housing to accommodate seasonal workers. 10 bedrooms in apartments or efficiencies would fulfill this need. The monument would seek partnership in Lukeville.

Plan Implementation

The General Management Plan is to be used as a comprehensive, general guidance for the next 10-15 years. Priorities have been established, though changes in funding, information, and situations may cause priorities to be shifted. The first priorities to be implemented include:

- build fire station
- develop and improve trail at Quitobaquito
- form partnership with ADOT to address State Route 85
- established pullouts in Route 85
- develop agreements with the Tohono O'odham and the NPS
- inventory, monitor, and mitigate impacts to threatened and endangered species (plant and animal)
- establish a program to mitigate impacts occurring from outside the monument (particularly to water and air)
- establish safety programs for abandoned mine lands
- inventory, evaluate, and monitor programs to protect cultural resources

Once a Record of Agreement has been signed, the NPS will attempt to implement all of the proposed actions within 10 to 15 years.

Biological Assessment and Final Opinion

The biological assessment was prepared as part of the formal consultation with the U.S. Fish and Wildlife Service regarding the potential effects of the proposed plan on the endangered species in the monument.

Lesser long-nosed bat (Leptonycteris curasoae yerbanbuena)

The lesser long-nosed bat is a seasonal resident in the monument, occurring from April and September. In 1989, the largest known maternity colony in the U.S. was discovered in an abandoned mine adit near Alamo Canyon. The NPS, through coordination with the FWS, has instituted an annual monitoring program to obtain data on the colony, including its size, diet, productivity, and habitat requirements.

NPS management proposals that may increase visitation in the Alamo Canyon area and could lead to disturbance of the lesser long-nosed bat maternity colony near-by include preparing a study to determine if campsites could be added; establishing a formal day-use parking area; and formalizing an existing social trail into a designated trail.

The NPS will continue to monitor the colony to assure that management actions dealing with

the campground expansion do not affect the bats. The FWS determined that increased visitation at Alamo Canyon will have no effect on the lesser long-nosed bat colony.

Sonoran Pronghorn (Antilocapra americana sonorensis)

OPCNM is within the historic range of the Sonoran pronghorn. NPS is not proposing actions that may directly affect the Sonoran pronghorn. Increased visitor use due to the proposed expansions may lead to indirectly affect the pronghorn. The USFWS has concluded that existing and future road conditions would continue to act as a barrier to pronghorn movement, and confine pronghorn to the west side of the monument. Such actions may adversely affect the pronghorn if it leads to reduce genetic variability and exchange. To help reduce the impact of State Route 85, the NPS proposes to :

- pursue an agreement with ADOT to (1) establish a vehicle for continued communication regarding road-related issues; 2) construct underpasses at known movement corridors to facilitate safe passage of pronghorn across the highway; and 3) establish a program to explore other measures to understand and reduce the impact of Route 85;
- continue working with the Arizona Department of Public Safety to enforce the existing speed limit;
- convert the top and bottom barbed wire strand fence around the monument's north and south fences to smooth wire to encourage pronghorn movements between Cabeza Prieta National Wildlife Refuge, OPCNM, and Mexico.

Quitobaquito Desert Pupfish (Cyprinodon macularius eremus)

The Quitobaquito desert pupfish is endemic to the spring outflows and pond at Quitobaquito, and is the only known fish to occur within the monument. Potential threats to the pupfish population include pollution, introduction of non-native fish, and other anthropogenic and environmental disturbances. A monitoring program has been conducted annually to assess the pupfish population. Trapping for non-native fish is ongoing and occurs at 10 week intervals.

The U.S. Fish and Wildlife Service determined the establishment and maintenance of a well-defined trail system with visitor use restrictions would have a beneficial effect on the pupfish and its critical habitat.

Cactus Ferruginous Pygmy-Owl (Glaucidium brasilianum cactorum)

The cactus ferruginous pygmy-owl is an uncommon permanent resident in the monument. The General Management Plan proposes three actions in the Alamo Canyon area which may affect the pygmy-owl or its habitat: 1) preparing a feasibility study to determine if campsites could be added; 2) establishing a formal day-use parking area; 3) formalizing an existing trail into a designated trail.

The USFWS determined the proposed actions in the Alamo Canyon area would have no effect on the pygmy-owl, due to lack of the presence of the owl, the low potential for human disturbance, and negligible habitat loss.

Monitoring (Rutman, pers.comm.)

- Long-term ecological monitoring occurs at various sites throughout the monument. At

these sites, vegetation is monitored every 5 to 10 years, small nocturnal animals, lizards, and birds are monitored yearly. There are several sites in the Pinacate Reserve.

There are nine core sites that contain climate stations. These stations measure wind speeds and direction, and precipitation hourly. The stations also have swell probes inserted in the soil, measuring soil moisture and temperature. The info is downloaded into a database.

- The demography of the Acuna cactus (*Echinomastus erectocentrus acunensis*) is monitored annually.
- Plots where buffelgrass removal has occurred are monitored yearly. So far, results are successful.
- Seasonal netting of bats.
- Annual growth of Organ Pipe and Senita cactus.
- Fire effects are studied.

References

USDI, National Park Service. 1994. *Statement for Management*.

USDI, National Park Service. 1997. *Final General Management Plan, Development Concept Plans, Environmental Impact Statement*.

RECON. June 2000. Priority Vulnerable Species: Data Compilation and Synthesis. Pima County Administrator's Office.

RECON. March 2000. Biological Stress Assessment. Pima County Administrator's Office.

Pima County. June 2000. Issues of Non-native Species in Public Reserves. Pima County Administrator's Office.

Rutman, Sue. Plant Ecologist; Organ Pipe Cactus National Monument. Personal communication, October 3, 2000.

State of Arizona

- Arizona State Parks Board
 - University of Arizona
 - Game and Fish Department)
- Catalina State Park
Santa Rita Experimental Range
-

Catalina State Park

Purpose: The purpose of Catalina State Park "is to preserve vital natural resources and processes while providing recreational opportunities which promote interaction with the natural environment" (Catalina State Park Management Plan).

Size: 5,493.29 acres

Ownership/Managing Entity

- 5474.29 acres owned by the U.S. Forest Service--Catalina State Park is part of the Santa Catalina Ranger District of the Coronado National Forest.
- Managed by the Arizona State Parks Board under a special use permit from the Coronado National Forest). The Arizona State Parks Board owns 19 acres at the entrance to the park.

Reserve Document

- Arizona State House Bill 2280

Activities Allowed

Natural Zone (~4,660 acres): Day-use activities only:

- Hiking
- Mountain biking
- Horseback riding
- Public education

Cultural Zone (~30 acres)

- Excavation, renovation of archeological sites

Park Development Zone (~800 acres):

- Camping
- Picnicking
- Any future developments

Known/Potential Biological Impact Areas and/or Activities

- The park development zone, about 800 acres, is developed for intensive visitor use and vehicular access. All infrastructure, roadway, parking, and maintenance facilities, ranger residence, campgrounds, picnic areas, group reservation areas, equestrian center, and trailhead and ranger station. All future development will take place in this zone.
- The park has high levels of equestrian use. Trail erosion associated with equestrian use is a ongoing problem at the park.

Priority Vulnerable Species

- Desert tortoise (*Gopherus agassizii*)
- Bighorn sheep (*Ovis canadensis mexicana*) (this particular herd may be extinct)

Candidates for Reestablishment

- Lowland leopard frog
- Others??

Potentially Problematic Species

- Several species of non-indigenous grasses grow along the roadways, park developments and camping grounds (Pima County, Issues of...June 2000).
- Increased housing development around the perimeter of the park may have the effect of cats, dogs, and non-indigenous plants spreading into the boundaries of the park.

Baseline Information

- *Detailed Vegetation Map:* Better veg map than GAP veg; soil and slope maps available: not digitized.
- *Plant Inventory:* Flowering plant and incomplete grass list available
- *Wildlife Inventory:* Incomplete reptile, amphibian, mammal and bird lists
- *Water Inventory:* Unknown
- *General Management Plan:* Yes
- *Fire Management Plan:* Yes
- *Evacuation Plan:* Yes
- *Monitoring Plan:* No

GAP Status

- Status 2

While the primary purpose of the park is to preserve natural resources, the management plan allows for intensive, anthropogenic disturbances such as developed or motorized recreation on more the 5% of the land.

Suppression of natural disturbances, such as fire, is called for in the Management Plan.

Natural Zone:

- Status 2
- 4,660 acres

Cultural Zone:

- Status 2
- 30 acres

Park Development Zone:

- Status 3b
- 800 acres

Management

Management plan objectives include six goals with various objectives to satisfy the stated park purpose. The goals are to:

- 1) preserve the integrity of all natural resources and natural processes occurring within the park;
- 2) preserve the integrity of all cultural resources in the park with respect to their physical, scientific and educational values;
- 3) provide a variety of outdoor recreational opportunities in an atmosphere which promotes awareness and appreciation and interaction with the Sonoran Desert;
- 4) promote a public awareness, understanding and appreciation of the natural, cultural and recreational resources represented in the park;
- 5) foster a positive public image of the resources, missions, and functions of the park and the agency;
- 6) fulfill the purpose and goals of the park through efficient and economical management of resources and functions.

Fire Plan

The park policy is of immediate and total suppression of all fires.

Evacuation Plan

During the event of natural disaster, fire, or any pervasive emergency at the park, the public will be cleared from the park.

Reference

Catalina State Park Management Plan. 1991. Arizona State Parks Board, Coronado National Forest USDA, Forest Service.

RECON. June 2000. Priority Vulnerable Species: Data Compilation and Synthesis. Pima County Administrator's Office.

Pima County. June 2000. Issues of Non-native Species in Public Reserves. Pima County Administrator's Office.

Santa Rita Experimental Range

Size

- 50,811 acres

Reserve Document

- Senate Bill 1249 exchanged the SRER out of public land into State Trust land.

Ownership/Managing Entity

- State of Arizona owns
- Management of the Range is the responsibility of the Director, AZ Agricultural Experiment Station, College of Agriculture, University of Arizona.

Activities Allowed

- The University of Arizona conducts research, education and extension work on biology, range management, animal science, entomology, geology, watershed, wildlife and related sciences.

Known/Potential Biological Impact Areas and/or Activities

- Sahuarita Road access, Madera Canyon access, adjoining subdivisions, trespass off-highway vehicles, hunter-hiker conflicts.

Priority Vulnerable Species

- Pima pineapple cactus (*Coryphantha scheeri* var. *robustspina*)
- Lesser long-nosed bat (*Leptonycteris curasoae yerbanbuena*)—likely
- Southwestern willow flycatcher (*Empidonax traillii extimus*)—may be found in xeroriparian areas.

Potentially Problematic Species

- Lehmann's lovegrass
- Buffelgrass

Baseline Information

- *Detailed Vegetation Map:* Seems like there should be
- *Fauna/Flora Inventory:* Flora/fauna lists available from Medina, 1996
- *Water Inventory:* ??

GAP Status

- Status 3b

The range has 71 miles of roads, 122 miles of traditional range fencing, several miles of water pipes, and 21 cattle guards.

The SRER land is leased to the U of A from the State of Arizona. The lease states, "The Premises shall be used solely and exclusively for ecological and rangeland research."

The SRER is used as an "outdoor experimental laboratory." Its sole purpose is not to maintain a natural state, but to explore ways to manage range lands for a variety of uses. This involves livestock grazing practices, brush control, fire as a management tool, population dynamics of wildlife species, and other uses.

Management

The Forest Service leases the 751 acre Florida Canyon Headquarters to the Arizona State Land Department. The Special Use Permit, signed in October 1991, includes a headquarters management plan and fire protection plan.

Monitoring

Repeat photography and on-the-ground vegetation monitoring can be accessed at <http://www.ag.arizona.edu/SRER>

References

Medina, Alvin L. May 1996. *The Santa Rita Experimental Range: Annotated Bibliography (1903-1988)*. Rocky Mountain Forest and Range Experiment Station. General Technical Report RM-GTR-276.

USDA Forest Service: Coronado National Forest, Nogales Ranger District. October 1, 1991. *Special Use Permit: Florida Work Center*.

RECON. March 2000. Biological Stress Assessment. Pima County Administrator's Office.

Kingsley, Ken. 2000. *DRAFT Potentially Problematic Species in Pima County*. Pima County Administrator's Office.

Arizona Game and Fish Department

Mission: "To conserve, enhance, and restore Arizona's diverse wildlife resources and habitats through aggressive protection and management programs, and to provide wildlife resources and safe watercraft and off-highway vehicle recreation for the enjoyment, appreciation, and use by present and future generations." (AGFD Brochure *Managing Today for Wildlife Tomorrow*)

Responsibilities (AGFD Brochure *Managing Today for Wildlife Tomorrow*)

- Wildlife management
- Fishing
- Heritage fund
- Boating
- Shooting sports
- Habitat protection
- Hunting
- Off-highway vehicles
- Law enforcement
- Wildlife watching

AGFD Properties

- ??

Wildlife Management Division (taken directly from the 1997-1998 Annual Report)

This division provides programs and policy direction and assistance for the management of wildlife. The wildlife management division develops, monitors, evaluates, and assists in implementation of strategic and operational plans.

Fisheries Branch

- Provides direction for sportfish programs, fish hatcheries and fish stocking, and operates the Urban Fisheries Program.
- Monitors the water quality of lakes and streams.

Game Branch

- Provides direction for terrestrial wildlife programs for game, waterfowl, predator, and furbearer species; recommends annual hunt regulations and conducts hunter surveys.
- Coordinates technical planning and reporting for the Heritage IIPAM and Urban Wildlife Programs.

Nongame Branch

- Provides direction for programs to maintain, enhance, and restore Arizona's natural biological diversity; gathers information on wildlife habitat; provides guidance for the management of nongame wildlife and threatened and endangered species.
- Provides public information about nongame/endangered wildlife and related recreation issues and activities.

Research Branch

- Conducts research to assist in proper management of terrestrial and aquatic wildlife.
- Develops new techniques to assist in managing wildlife populations.

Habitat Branch

- Provides direction for habitat evaluation and protection.
- Coordinates review and monitoring of activities by other agencies that may impact wildlife habitat.
- Administers land and water right programs; negotiates acquisition and conservation easements; prepares and maintains land use agreements.
- Coordinates the preparation of environmental impact documents.
- Coordinates GIS and Heritage data management system with other agencies.

Special Services Division (taken directly from the 1997-1998 Annual Report)

The Special Services Division provides support services for all Department functions. The Division maintains finance and accounting support and telecommunications and data processing services; administers and manages the AGFD vehicle fleet.

Information Systems Branch

- Provides data processing capabilities, including systems analysis and design.
- Provides support for the AGFD computers, phone system, LANs, WANs, and backbone network connections to Internet, DPS, DOA, and contract data entry services.

Development Branch

- Manages programs for water development, habitat improvement and maintenance, boater access, and aids to navigation; develops and maintains dams and fishing lakes.

- Evaluates access needs to state, federal, and private lands; negotiates easements on private lands.
- Provides engineering functions for feasibility studies to determine design and specification standards and to supervise/inspect contracts for AGFD projects.

Finance and Accounting Branch

- Provides finance and accounting support; prepares financial and cost statements.
- Oversees watercraft registration, license dealers, and big-game drawings.
- Coordinates data entry contract work; processes payments to vendors, contract workers, employees, and other government agencies.

Support Services Branch

- Administers procurement; maintains supply warehouse; administers and maintains moor pool vehicles; maintains property/equipment inventory.
- Assists in developing equipment budget request; disposes of surplus property; provides AGFD printing, mailing, and courier services.
- Prepares specifications/bid invitations; conducts dealer mail-outs.

Field Operations Division (taken directly from the 1997-1998 Annual Report)

- Administers programs for fisheries, wildlife and habitat management; watercraft and OHVs; public information and education.
- Administers AGFD's Aviation and Law Branch.

Information and Education Division (taken directly from the 1997-1998 Annual Report)

The Information and Education Division promotes public awareness of AGFD's mission and activities. This division provides diverse information and education programs to foster responsible public actions toward wildlife resources.

Information Branch

- Distributes info on wildlife, regulations, OHV, Heritage, Sportfish and Wildlife Restoration programs, and other AGFD activities.

Education Branch

- Develops and implements hunter, aquatic resources, boating, and environmental education programs; presents wildlife workshops for teachers, hunters, and the public.

Heritage Fund (taken directly from the 1997-1998 Annual Report)

Public Access

- Identify, evaluate, and administer programs for public access. Provide info on public access and recreational use of public lands. Administer Heritage programs for Access Grants-in-Aid, Stewardship, Landowner/Lessee Sportsmen Respect, and Adopt-a-Ranch programs.

Urban Wildlife

- Conserve, enhance, and establish wildlife habitats and populations in harmony with urban environments. Increase public awareness of urban wildlife resources. Work with local governments and other organizations to reduce the impact of urban development on wildlife.

Habitat Acquisition

- Evaluate acquisition proposals to determine their suitability for protection; prepare environmental documents determine impact of acquisitions. Acquire suitable habitat to protect threatened or endangered fish and wildlife.

Habitat Evaluation and Protection

- Protect and enhance Arizona's natural biological diversity and abundance through habitat management and protection by evaluating proposed projects for their impact on fish and wildlife resources and monitoring environmental compliance and mitigation commitments.
- Coordinate GIS and Heritage data management system to track status of threatened and endangered species. Coordinate land and water rights program.

Environmental Education

- Promote awareness, appreciation, and understanding of Arizona's wildlife and its environment and increase responsible actions toward wildlife through the educational grants-in-aid program, natural history teacher workshops, and by providing additional resources made possible by the Heritage Fund.

IIPAM--Identification, Inventory, Protection, and Management

- Identify and inventory occurrence of Arizona native fish, amphibians, reptiles, birds, and mammals. Implement techniques and develop tools for use in the protection and

management of designated and candidate sensitive species and sensitive habitats.

Research

- Cactus ferruginous pygmy-owl
- ??

Monitoring

- Cactus ferruginous pygmy-owl
- More...???

References

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Pima County

Tucson Mountain Park
Tortolita Mountain Park
Colossal Cave Mountain Park
Arthur Pack Regional Park
Agua Caliente Park
Cienega Creek Preserve & Empirita Ranch
Southeast Regional Park

Tucson Mountain Park

Size

- 19,491.94 acres

Ownership/Managing Entity

- Pima County Natural Resources, Parks and Recreation Department

Reserve Document

Administrative Withdrawal, Recreation Act of 1926

Activities Allowed

- New roadways
- Utilities
- Groundwater pumping
- Sewage treatment
- Hiking
- Mountain biking
- Camping/campground
- Horseback riding
- Picnicking
- Archery/rifle range
- Hunting/Archery
- Public education
- Birding
- Photography
- Resource Interpretation
- Wildlife observation
- Research

Known/potential Biological Impact Areas or Activities

- Trails
- Lessee special events and activities
- Archery/Hunting ranges
- Roads
- Air Traffic
- Utilities
- Proposal by the Public Service Company of New Mexico to construct and operate high-voltage electrical transmission lines through the Tucson Mitigation Corridor.

Priority Vulnerable Species

Mammals-

- Mexican Long-tongued bat(*Choeronycteris mexicana*)-Likely uses food resource in area
- Lesser Long-nosed bat(*Leptonycteris curasoae yerbanbuena*)-May use the area for food resources
- California Leaf-nose bat(*Macrotus californicus*)-Uses the area for food and roost resources
- Merriam's mesquite mouse (*Peromyscus merriam*)-May use food and shelter resources
- Pale Townsend's big-eared bat (*Plecotus townsendii pallescens*) - Likely to use food resources

Birds-

- Rufous winged sparrow(*Aimophia caralis*)-May be found in Tucson Mountain Park
- Swainson's hawk (*Buteo swainson*)-May be found in Tucson Mountain Park
- Cactus ferruginous pygmy owl (*Glaucidium brasilianum cactorum*)-May be found in Tucson Mountain Park
- Abert's towhee (*Pipilo aberti*)-Likely to be found in Tucson Mountain Park
- Bell's vireo (*Vireo bellii*)-Likely to be found in Tucson Mountain Park

Reptiles-

- Tucson Shovel-nosed snake (*Chionactis occipitalis klauberi*)-May be found in Tucson Mountain Park
- Giant spotted whiptail (*Cnemidophorus burti stictogrammus*)-Likely to found in Tucson Mountain Park
- Ground snake (valley form) (*Sonora semiannulata*)-May be found in Tucson Mountain Park

Plants-

- Pima pineapple cactus (*Coryphantha scheeri* var. *robotispina*)-May be found in Tucson Mountain Park
- Gentry indigo bush(*Dalea tentaculoides*)-May be found in Tucson Mountain Park
- Nichol Turk's head cactus (*Echinocactus horizonthalonius* var. *nicholii*)-May be found in Tucson Mountain Park
- Acuna cactus (*Echinomastus erectocentrus* var. *acunensis*)-May be found in Tucson Mountain Park
- Needle-spined pineapple cactus (*Echinomastus erectocentrus* var. *erectocentrus*)-May be found in Tucson Mountain Park
- Tumamoc globeberry (*Tumamoca macdougallii*)-May be found in Tucson Mountain Park

Potentially Problematic Species

The problematic plant species for Tucson Mtn. Park are:

- Lehmann lovegrass (*Eragrostis lehmanniana*)
- Fountain grass (*Pennisetum setaceum*)
- Red brome (*Bromus ruens*)
- Bermuda grass (*Cynodon dactylon*)
- Mouse barley (*Hordeum murinum*)
- Buffelgrass (*Pennisetum ciliare*)

The problematic animal species for Tucson Mtn. Park are:

- European starling (*Sturnus vulgaris*)

Baseline Information

None

GAP Status

- Status 2

Acquisitions since 1/99

June 1999	Abdulaziz purchase	293.92 acres
January 2000	Holsclaw purchase	10.36 acres
January 2000	Stompoly purchase	1.00 acres
August 2000	Dos Picos purchase	90.00 acres
August 2000	Shepard purchase	20.00 acres
November 2000	Perper/Rollings purchase	746.26 acres

Management

- A process to develop a management plan integrating the new Adaptive Management Plan guidelines will begin in the near future. This plan will include a resource inventory and policies dealing with the conservation of biological species and recreational use of the park. In addition, the plan will address staffing and budget issues.
- Current management concerns include impacts of off-trail use, domestic pets, exotic plants and animals, and road-killed wildlife. Although there are many positive benefits to developments within the park including the Arizona-Sonora Desert Museum and Old Tucson, expansion of these facilities does increase traffic and demands on the parks water supply, and leads to higher park maintenance costs.
- Adjacent land uses also impact the park as residential and commercial development increase along the parks south and west borders. Pollution generated by traffic and the increased population in the Tucson basin will also negatively impact the park in years to come. In addition, visual resources will become subject to impact as development is planned to occur in the viewshed of some of the major area tourist attractions such as Gates Pass and the Arizona-Sonora Desert Museum. Currently, the Public Service Company of New Mexico has proposed that high-voltage electrical transmission lines be constructed through the Tucson Mitigation Corridor which is managed as part of the Tucson Mountain Park. Should that proposal be approved, severe environmental impacts will occur including negative impacts to the outstanding visual quality of Tucson Mountain Park.

Restoration

- Several structures originally built by the CCC are being restored within the park.

Monitoring

- No current efforts

Research

- No current efforts

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Tortolita Mountain Park

Size

- 3,445.75 acres

Ownership/Managing Entity

- Pima County Natural Resources, Parks and Recreation Department

Reserve Document

- Formally established by the Pima County Board of Supervisors

Activities Allowed

- Utilities
- Hiking
- Horseback riding
- Mountain biking
- Picnicking
- Hunting

Known/potential Biological Impact Areas and/or Activities

- Existing surface mine site for marble and decomposed granite
- Grazing
- Utilities

Priority Vulnerable Species

Mammals-

- Mexican Long-tongued bat (*Choeronycteris mexicana*) – Likely uses food resources
- Allen's Big-eared bat (*Idionycteris phyllotis*) – May use the riparian areas
- Western red bat (*Lasiurus blossevi* Liii) – May use the riparian areas in Tortolita Mtn. Park.
- Southern Yellow bat (*Lasiurus xanthinus* (ega)) - May use the riparian areas in Tortolita Mtn. Park.
- Lesser Long-nosed bat (*Leptonycteris curasoae yerbanbuena*) - Likely uses food resources
- California Leaf-nose bat (*Macrotus californicus*) - Likely uses food resources
- Merriam's mesquite mouse (*Peromyscus merriami*) - Likely uses food and shelter resources
- Pale Townsend's big-eared bat (*Plecotus townsendii pallescens*) - Likely to use food resources

Birds-

- Rufous winged sparrow (*Aimophila caralis*) – May be found in Tortolita Mtn. Park
- Burrowing owl (*Cunicularia hypugaea*) – Possibly on the flat bajadas to the west of Tortolita Mtn. Park near the Santa Cruz River.
- Swainson's hawk (*Buteo swainsoni*) – May be incidental to Tortolita Mtn. Park
- Western yellow-billed cuckoo (*Coccyzus americanus* ssp. *occidentalis*) – May be found in the riparian areas of Tortolita Mtn. Park.
- Southwestern willow flycatcher (*Empidonax traillii extimus*) - May be found in the riparian areas of Tortolita Mtn. Park.
- Cactus ferruginous pygmy owl (*Glaucidium brasilianum cactorum*) - May be found in the riparian areas and the lower bajadas of Tortolita Mtn. Park.
- Abert's towhee (*Pipilo aberti*) – Likely in Tortolita Mtn. Park
- Bell's vireo (*Vireo bellii*) – Likely to be found in Tortolita Mtn. Park

Reptiles-

- Tucson Shovel-nosed snake (*Chionactis occipitalis klauberi*) - May be found in Tortolita Mtn. Park
- Giant spotted whiptail (*Cnemidophorus burti stictogrammus*) - Likely to be found in Tortolita Mtn. Park
- Ground snake (valley form) (*Sonora semiannulata*) - Likely to be found in Tortolita Mtn. Park
- Mexican garter snake (*Thamnophis eques megalops*) - Likely to be found in Tortolita Mtn. Park in riparian areas

Invertebrates-

- Talus snails (*Sonorella* sp.) – May occur in Tortolita Mtn. Park

Plants-

- Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*) – May be found in Tortolita Mtn. Park.
- Gentry indigo bush (*Dalea tentaculoides*) - May occur in Tortolita Mtn. Park
- Nichol Turk's head cactus (*Echinocactus horzonthalonius* var. *nicholii*) - May occur in Tortolita Mtn. Park
- Needle-spined pineapple cactus (*Echinomastus erectocentrus* var. *erectocentrus*) - May occur in Tortolita Mtn. Park
- Tumamoc globeberry (*Tumamoca macdougallii*) – May be found in Tortolita Mtn. Park

Potentially Problematic Species

The problematic plant species for Tortolita Mtn. Park are:

- Lehmann lovegrass (*Eragrostis lehmanniana*)
- Fountain grass (*Pennisetum setaceum*)
- Red brome (*Bromus ruens*)
- Bermuda Grass (*Cynodon dactylon*)
- Salt cedar (*Tamarix* sp.)
- Mouse barley (*Hordeum murinum*)

The problematic animal species for Tortolita Mtn. Park are:

- Feral horses (*Equus caballus*)
- Emus ?

Baseline Information

- None

GAP Status

- Status 3a

Acquisitions since 1/99

- May 1999 Carpenter Ranch purchase 200 acres

Management

Tortolita Mountain Park has a master plan which addresses proposed park expansion, public use, facility development, resource protection and management, and administration and staffing. A management plan will be developed in the future to integrate the management of this park with the Pima County Adaptive Management Plan and the goals of the Sonoran Desert Conservation Plan.

At the present time, public access to the park has not yet been secured and there is no staff presence in the park.

Restoration

- No current efforts

Monitoring

- No current efforts

Research

- No current efforts

References

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Vegetation and Flora of the Sonoran Desert, Stanford University Press, 1964

Colossal Cave Mountain Park

Size

- 2,586.15 acres

Ownership/Managing Entity

- Pima County Natural Resources, Parks and Recreation Department
- Managed by the Pima County Parklands Foundation

Reserve Document

- Formally established by Pima County Board of Supervisors in 1992.

Activities Allowed

- Hiking
- Camping
- Birding
- Picnicking
- Public education
- Cave tours

Posta Quemada:

- Stables-organized tours/horse trails
- Riparian hiking
- Cowboy cookouts
- Utilities

Known/potential Biological Impact Areas and/or Activities

- Riparian areas
- Picnic Sites
- Utilities

Priority Vulnerable Species

Mammals-

- Mexican Long-tongued bat (*Choeronycteris mexicana*)-Uses food and shelter resources in Colossal Cave Mountain Park
- Allen's Big-eared bat (*Idionycteris phyllotis*)-Uses food and shelter resources in Colossal Cave Mountain Park
- Western red bat (*Lasiurus blossevillii*)-May use food and shelter resources in Colossal Cave Mountain Park
- Southern Yellow bat (*Lasiurus xanthinus (ega)*)-May use food and shelter resources in

Colossal Cave Mountain Park

- Lesser Long-nosed bat (*Leptonycteris curasoae yerbanbuena*)-Uses food and shelter resources in Colossal Cave Mtn. Park
- California Leaf-nose bat (*Macrotus californicus*)-Uses the area for food and roost resources
- Merriam's mesquite mouse (*Peromyscus merriam*)-May use food and shelter resources in mesquite bosques along the Posta Quemada Wash.
- Pale Townsend's bit-eared bat (*Plecotus townsendii pallescens*)-Uses food and shelter resources in Colossal Cave Mountain Park

Fish-

- Longfin dace (*Agosia chrysogaster*)- Only when Posta Quemado and Aqua Verde creeks run

Birds-

- Rufous winged sparrow (*Aimophila caralis*)-Likely found in Colossal Cave Mountain Park.
- Swainson's hawk (*Buteo swainsoni*)-May be incidental to Colossal Cave Mountain Park.
- Western yellow-billed cuckoo(*Coccyzus americanus ssp. occidentalis*)-May be incidental to Colossal Cave Mountain Park
- Cactus ferruginous pygmy owl (*Glaucidium brasilianum cactorum*)-May be incidental to Colossal Cave Mountain Park
- Abert's towhee (*Pipilo aberti*)-Likely to be found in Colossal Cave Mountain Park
- Bell's vireo (*Vireo bellii*)-Likely to be found in Colossal Cave Mountain Park

Reptiles-

- Tucson Shovel-nosed snake (*Chionactis occipitalis klauberi*)- May be found in Colossal Cave Mountain Park
- Giant spotted whiptail (*Cnemidophorus burti stictogrammus*)-Likely to be found in the Colossal Cave Mountain Park
- Ground snake (valley form) (*Sonora Semiannulata*)-May be found in Colossal Cave Mountain Park
- Desert box turtle (*Terrapene ornata luteola*)-May be found in Colossal Cave Mountain Park
- Mexican garter snake (*Thamnophis eques megalops*)-May be found in Colossal Cave Mountain Park

Invertebrates-

- Arkenstone cave pseudoscorpion (*Albiorix anophthalmus*)-Is found in Colossal Cave Mountain Park
- Taus snails (*Sonorella sp.*) – May be found in Colossal Cave Mountain Park

Plants-

- Pima pineapple cactus (*Coryphantha scheeri var. robustispina*)-May be found in Colossal Cave Mountain Park
- Gentry indigo bush (*Dalea tentaculoides*)-May be found in Colossal Cave Mountain Park

- Nichol turk 's head cactus (*Echinocactus horizonthalonius* var. *nicholii*)- May be found in Colossal Cave Mountain Park
- Needle-spined pineapple cactus (*Echinomastus erectocentrus* var. *erectocentrus*) – May be found in Colossal Cave Mountain Park
- Tumamoc globeberry (*Tumamoc macdougali*) – May be found in Colossal Cave Mountain Park

Potentially Problematic Species

The problematic plant species for Colossal Cave Mtn. Park are:

- Lehmann lovegrass (*Eragrostis lehmanniana*)
- Fountain grass (*Pennisetum setaceum*)
- Red brome (*Bromus ruens*)
- Bermuda grass (*Cynodon dactylon*)
- Salt cedar (*Tamarix* sp.)
- Mouse barley (*Hordeum murinum*)
- Buffelgrass (*Pennisetum caliare*)

The problematic animal species for Colossal Cave Mtn. Park are:

- Feral cats (*Felis domesticus*)
- European starling (*Sturnus vulgaris*)

Baseline Information

- None

GAP Status

- Status 3a

Acquisitions since 1/99

October 1999	Bradley purchase	40.00 acres
October 1999	Dailey purchase	40.00 acres
October 1999	Dailey purchase	117.68 acres
February 2000	Alpher purchase	78.34 acres
February 2000	Alpher purchase	78.53 acres

Other Acquisitions:

December 1999	Parklands Foundation	76.16 acres
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Management:

The Pima County Parklands Foundation currently has an administration agreement with Pima County granting the Foundation management responsibility for Colossal Cave. The Foundation has a separate agreement with Joe and Martie Maierhauser for the purpose of operating the park.

Current management issues include encroachment of urban development. When implemented, the multi-use Arizona Trail will increase park visitation. Mountain bikes are not presently permitted on existing trails.

Restoration:

Recent efforts include restoration several buildings including the corrugated metal barn and stabilization of the CCC adobe office.

Monitoring:

Current monitoring activities include bats, cave research, climate, and saguaro phenology

Research:

None

References:

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Arthur Pack Regional Park

Size

- 501.58 acres

Ownership/Managing Entity

- Pima County Natural Resources, Parks and Recreation Department

Reserve Document

- Acquisition US Land Patent via The Public Purpose Act of June 14, 1926--revised in 1970. Land patented to Pima County in May 12, 1977

Activities Allowed

- Golf Course
- Baseball
- Soccer
- Basketball
- Playgrounds
- Trails
- Cross Country Running Track along Hardy Wash

Known/potential Biological Impact Areas and/or Activities

- Primary biological habitat is located within the Hardy Wash corridor along the southern portion of the site. Hardy Wash maintains some of the most unique Ironwood / Mesquite/ Saguaro communities in the area. In 1994/1995 a sports field complex was developed in close proximity to Hardy Wash. The track team from Mountain View High School is permitted to use the area along and within Hardy Wash as a cross country track.

Priority Vulnerable Species

Mammals-

- Merriam's mesquite mouse (*Peromyscus merriami*) - May use food and shelter resources in the Hardy Wash Corridor. Further sampling of the area needs to be performed to be sure.

Birds-

- Rufous winged sparrow (*Aimophila caralis*) - May use food and shelter resources in the Hardy Wash Corridor. Further sampling of the area needs to be performed to be sure.
- Swainson's hawk (*Buteo swainsoni*) - May be incidental to the Hardy Wash Corridor.
- Cactus ferruginous pygmy owl (*Glaucidium brasilianum cactorum*) - Survey results

completed by Harris Environmental, May 17, 1999 indicates the presence of Cactus Ferruginous Pygmy Owl.

- Abert's towhee (*Pipilo aberti*) – Likely to be found in the Hardy Wash Corridor.
- Bell's vireo (*Vireo bellii*) – Likely to be found in the Hardy Wash Corridor.

Reptiles-

- Tucson Shovel-nosed snake (*Chionactis occipitalis klauberi*) – May be found in the Hardy Wash Corridor. Further sampling of the area needs to be performed to be sure.
- Giant spotted whiptail (*Cnemidophorus burti stictogrammus*)- Likely to be found in the Hardy Wash Corridor.
- Ground snake (valley form) (*Sonora semiannulata*) - May be found in the Hardy Wash Corridor.

Plants-

- Gentry indigo bush (*Dalea tentaculoides*) –May be incidental. Further sampling of the area needs to be performed to be sure.
- Tumamoc globeberry (*Tumamoca macedougalii*) – May be found in Hardy Wash Corridor.

Potentially Problematic Species

The problematic plant species along the Hardy Wash Corridor are:

- Lehmann lovegrass (*Eragrostis lehmanniana*)
- Fountain grass (*Pennisetum setaceum*)
- Red brome (*Bromus ruens*)
- Bermuda Grass (*Cynodon dactylon*)
- Salt cedar (*Tamarix* sp.)
- Mouse barley (*Hordeum murinum*)
- Buffelgrass (*Pennisetum ciliare*)

The problematic animal species along the Hardy Wash Corridor are:

- European starling (*Sturnus vulgaris*)- Survey results completed by Harris Environmental, May 17, 1999 indicates the abundant presence of *Sturnus vulgaris* (Starlings), which are competitors for nest cavities with the Pygmy Owl.
- Feral cats (*Felis domesticus*)

Baseline Information

- None

GAP Status

- Status 3b

Acquisitions since 1/99

- None

Management

Arthur Pack Regional Park has been managed as an active recreational park with extensive sports fields and a golf course development. The survey completed by Harris Environmental on May 17, 1999 indicates the presence of Cactus Ferruginous Pygmy Owl within the park. That report recommends the Hardy Wash corridor be conserved for Pygmy Owl habitat.

Restoration

- No current efforts

Monitoring

- No current efforts

Research

- No current efforts

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Roy P. Drachman-Agua Caliente Regional Park

Size

- 101 acres

Ownership/Managing Entity

- Pima County Natural Resources, Parks and Recreation Department

Reserve Document

- Formally established by the Pima County Board of Supervisors in 1984

Activities Allowed

- Birding
- Picnicking
- Public education
- Wildlife viewing
- Painting
- Photography

Known/potential Biological Impact Areas and/or Activities

- Non-point source pollution
- Illegal fishing
- Illegal hunting
- Releasing of domestic pets
- Dogs
- Development outside the park has an adverse impact on the spring due to blasting
- Spring impact from human activities

Priority Vulnerable Species

Mammals-

- Mexican Long-tongued bat (*Choeronycteris mexicana*)-Likely uses food resources
- Allen's Big-eared bat (*Idionycteris phyllostis*)-May use the area for food resources
- Western red bat (*Lasiurus blossevillii*)-Likely uses the area for roost and food resources
- Southern Yellow bat (*Lasiurus xanthinus*(ega))-Likely uses the area for food resources
- Lesser Long-nose bat (*Leptonycteris curasoae yerbanbuena*)-May use food and shelter resources
- California Leaf-nose bat (*Macrotus californicus*)-May use area for food resources
- Merriam's mesquite mouse (*Peromyscus merriam*)-May use food and shelter resources
- Pale Townsend's big-eared bat (*Plecotus townsendii pallescens*)-May use the area for food resources

Birds-

- Rufus winged sparrow (*Aimophila caralis*)-Likely uses area for nesting and food resources
- Swainson's hawk (*Buteo swainsoni*)-May be incidental
- Western yellow-billed cuckoo (*Coccyzus americanus* ss. *occidentalis*)-May be incidental

Reptiles-

- Giant spotted whiptail (*Cnemidophorus burti stictogrammus*)-Likely to be found in Agua Caliente
- Mexican garter snake (*Thamnophis eques megalops*)-May be found in park

Fish-

- Longfin dace (*Gosia chrysogaster*)-Likely to be found in Agua Caliente Park
- Gila chub(*Gila intermedia*)-Conditions may be present to support a small population
- Gila topminnow(*Poeciliopsis occidentalis occidentalis*)-Conditions may be present in the stream to support a small population

Potentially Problematic Species

The problematic plant species for Agua-Caliente Park are:

- Red brome (*Bromus ruens*)
- Fountain grass (*Pennisetum setaceum*)
- Tamarisk sp. (*Tamarix* sp.)
- Bermuda grass (*Cynodon dactylon*)
- Lehmann lovegrass (*Eragrostis lehmanniana*)
- Cattails (*Typha latifolia*)
- Broom snakeweed(*Gutierrezia sorothrae*)
- Bulrush (*Scirpus* spp.)
- Mouse barley (*Hordeum murinum*)
- Buffelgrass(*Pennisetum ciliare*)

The problematic animal species for Agua-Caliente Park are:

- Feral cats (*Felis domesticus*)
- Bullfrog (*Rana catesbeiana*)
- Crayfish (*Oxconectes* sp.)
- European starling (*Sturnus vulgaris*)
- Non-native turtles
- Non-native fish

Baseline Information

- *Detailed Vegetation Mapping:* None
- *Flora/Fauna Lists:* Partial
- *Water Inventory:* Yes

GAP Status

- Status 3a

Acquisitions since 1/99

- None

Management

- Current management issues include dogs off leash harassing and/or killing wildlife, groundwater depletion and illegal fishing.

Restoration

- The bunkhouse was recently restored, and the ranch house and caretaker's cottage are scheduled for restoration in 2001.

Monitoring

- No current efforts

Research

- Current research efforts include study by a University of Arizona Graduate student, Alexander Leonard, who is measuring pH, conductivity, flow rates and temperatures, and ion concentration

References

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Cienega Creek Natural Preserve

Size

- 4,105 acres

Ownership/Managing Entity

- Owner-Pima County Department of Transportation and Flood Control
- Manager-Pima County Natural Resources, Parks and Recreation Department

Reserve Document

- Formally established by the Pima County Board of Supervisors

Activities Allowed

- Hiking-maximum 50 people per day
- Birding
- Train watching
- Photography
- Painting

Known/potential Biological Impact Areas and/or Activities

- Illegal entrance and use of the preserve
- Illegal off-road vehicle use
- Illegal hunting
- Wildcat dumping
- Railroad-potential derailment
- Encroachment by development-aquifer depletion/contamination
- Non-point source pollution-Golf Course fertilizer/chemical impacts
- Impacts of cattle grazing
- Construction impacts (pipeline/cable/power)
- Illegal harvesting of firewood
- Chemical Spills on I-10

Priority Vulnerable Species

Mammals-

- Mexican Long-tongued bat (*Choeronycteris mexicana*)-Uses food and shelter resources
- Allen's Big-eared bat (*Idionycteris phyllotis*)-May use food resources in Cienega Creek Preserve
- Western red bat (*Lasiurus blossevillii*)-Uses food and shelter resources in Cienega Creek Preserve
- Southern Yellow bat(*Lasiurus xanthinus*)-May use food and shelter resources

- Lesser Long-nosed bat (*Leptonycteris curasoae yerbanbuena*)-May use food resources in Cienega Creek
- California Leaf-nose bat (*Macrotus californicus*)-May use food resources in Cienega Creek Preserve
- Merriam's mesquite mouse (*Peromyscus merriam*)-Likely to use food and shelter in the mesquite osques along the Posta Quemada Wash

Birds-

- Rufus winged sparrow (*aimophila caralis*)-May be found in Cienega Creek Preserve
- Swainson's hawk (*Bueteo swainsom*)-May be incidental to the Cienega Creek Preserve
- Western yellow-billed cuckoo (*Coccyzus americanus ssp. occidentalis*)- May be incidental to the Cienega Creek Preserve
- Cactus ferruginous pygmy owl (*Glaucidium brasilianum cactorum*)-Has been identified in the Preserve, but is probably incidental
- Abert's towhee (*Pipilo aberti*)-Likely to be found in Cienega Creek Preserve
- Bell's vireo (*Vireo bellii*)-Likely to be found in Cienega Creek Preserve

Reptiles-

- Chiricahua leopard frog (*Rana chiricahuensis*)-May be found in Cienega Creek Preserve
- Lowland leopard frog (*Rana yavapaiensis*)-Is found in Cienega Creek Preserve

Fish-

- Longfin dace (*Agosia chrysogaster*)-Is found in Cienega Creek Preserve
- Gila chub (*Gila intermedia*)-May be found in Cienega Creek Preserve
- Gila topminnow (*Poeciliopsis occidentalis occidentalis*)-May be found in Cienega Creek Preserve

Invertebrates-

- Arkenstone cave psuedoscorpion (*Albiorix anophthalmus*)-May be found in Cienega Creek Preserve

Plants-

- Pima pineapple cactus (*Coryphantha scheeri var. robutispina*)-May be found in Cienega Creek Preserve
- Gentry indigo bush (*dalea tetaculoides*)-May be found in Cienega Creek Preserve
- Nichol Turk's head cactus (*Echinocactus horizonthalonius var. nicholii*)-May be found in Cienega Creek
- Needle-spined pineapple cactus (*Echinomastus erectocentrus var. erectocentrus*)-May be found in Cienega Creek Preserve
- Huachuca water umbel (*Lilaeopsis schaffneriana recurva*)-May be found in Cienega Creek
- Tumamoc globeberry (*Tumamoca macdougallii*)-May be found in Cienega Creek

otentially Problematic Species

The potentially problematic plant species for Cienega Creek Preserve are:

- Lehman lovegrass (*Eragrostis lehmanniana*)
- Fountain grass (*Pennisetum setaceum*)
- Red brome (*Bromus ruens*)
- Bermuda grass (*Cynoden dactylon*)
- Salt Cedar (*Tamarix sp.*)
- Mouse barley (*Hordeum murinum*)
- Buffelgrass (*Pennesetum ciliare*)
- Johnsongrass (*Sorghum halepense*)

The potentially problematic animal species for Cienega Creek Preserve are:

- Feral cats (*Felis domesticus*)
- Exotic fish species
- Bull frogs (*Rana catesbeiana*)
- Crayfish (*Orconectes sp.*)

Baseline Information

- *Detailed Vegetation Mapping:* Yes
- *Flora/Fauna Lists:* Partial
- *Water Inventory:* Partial

GAP Status

- Wheeler Trust Purchase-Status 1a
- Remainder of Cienega Creek Natural Preserve-Status 3a

Acquisitions since 1/99

- None

Management

Current management issues include the ongoing presence of cattle within the preserve due to fence line destruction from seasonal rains, off-road vehicular use due to increase urbanization, human impact from illegal entrance and uses of the preserve, invader and exotic species, and construction impacts from pipelines/cable companies/fiber optic lines.

Restoration

- No current efforts

Monitoring

- Current monitoring efforts include the Southeastern Arizona Winter Amphibian Monitoring Project-2000
- Lowland Frog Research, groundwater, and floods.

Research

- No current efforts

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Southeast Regional Park

Size:

- 2,350 acres

Ownership/Managing Entity

- Pima County Natural Resources, Parks and Recreation Department

Reserve Document

- None

Activities Allowed

- Hunting
- Pima County Fairgrounds
- Southwestern International Raceway
- Future OHV recreation at Pima Motorsports Park
- Utilities

Known/potential Biological Impacts Areas and/or Activities

- Off-road use
- Illegal hunting
- Cattle grazing
- Dumping
- Utilities

Priority Vulnerable Species

Mammals-

- Mexican Long-tongued bat (*Choeronycteris mexicana*) – Likely uses food resources
- Lesser Long-nosed bat (*Leptonycteris curasoae yerbanbuena*) - Likely uses food resources
- California Leaf-nose bat (*Macrotus californicus*) - Likely uses food resources
- Merriam's mesquite mouse (*Peromyscus merriami*) - May be present in Southeast Regional Park
- Pale Townsend's big-eared bat (*Plecotus townsendii pallescens*) - Likely to use food resources

Birds-

- Swainson's hawk (*Buteo swainsoni*) – May be incidental
- Abert's towhee (*Pipilo aberti*) – May be incidental to Southeast Regional Park
- Bell's vireo (*Vireo bellii*) – Likely to be found in Southeast Regional Park

Reptiles-

- Tucson Shovel-nosed snake (*Chionactis occipitalis klauberi*) - May be found in Southeast Regional Park
- Giant spotted whiptail (*Cnemidophorus burti stictogrammus*) - May occur in Southeast Regional Park
- Ground snake (valley form) (*Sonora semiannulata*) - May occur in Southeast Regional Park

Plants-

- Pima pineapple cactus (*Coryphantha scheeri* var. *robotispina*) – Does occur in Southeast Regional Park
- Tumamoc globeberry (*Tumamoca macdougalii*) – May be found in Southeast Regional Park

Potentially Problematic Species

- Lehmann lovegrass (*Eragrostis lehmanniana*)
- Red brome (*Bromus ruens*)
- Bermuda Grass (*Cynodon dactylon*)
- Salt cedar (*Tamarix* sp.)
- Mouse barley (*Hordeum murinum*)

Baseline Information

- None

GAP Status

- Status 3b

Acquisitions since 1/99

- None

Management

This park has been managed to meet the demand of various recreational uses. In addition to the current uses of the park this area is being considered for a district park site and a shooting range. Any future planning studies should support a current effort to set aside a reserve for Pima Pineapple Cactus in this same vicinity, and the existing 40 acre Pima Pineapple Cactus Conservation Area in Section 15 identified during development of Pima Motorsports Park.

Restoration

- No current efforts

Monitoring

- Pima County Parks and Recreation monitors the Pima Pineapple Cactus Conservation Area in Section 15.

Research

- Pima Motorsports Park was surveyed for Cactus Ferruginous Pygmy Owl in 1998 and 1999, and no owls were found.

References

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Don Carter, Natural Resource Specialist, Pima County Natural Resources, Parks and Recreation Dept.

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The Nature Conservancy

Buehman Canyon
Bingham Cienega (management agreement with Pima
County)

Buehman Canyon

Size

- 2,793 acres

Owner/Managing Entity

- The Nature Conservancy

Reserve Document

- Deeds to the properties

Activities Allowed

- Mining
- Hunting
- Hiking
- Picnicking
- Environmental education

Known/Potential Biological Impact Areas and/or Activities

- Unknown

Priority Vulnerable Species

- Longfin dace

Potentially Problematic Species

- Bullfrog

Baseline Information

- *Detailed Vegetation Map:*
- *Fauna/Flora Inventory:*
- *Water Inventory:*

GAP Status

- Status 1b

TNC lands have permanent protection and are managed to maintain a natural state and natural

processes. A portion of Buehman Canyon Natural Preserve has an active mining claim.

TNC has conservation easements on privately owned lands. The easements are intended to be perpetual, and are meant to prohibit the conversion of natural cover and to maintain a natural state over a majority of the property. Other portions of a property may be subject to localized extractive uses. These lands are given a GAP status 3.

Management

- Unknown

Monitoring

- Unknown

Research

- Unknown

Bingham Cienega Natural Preserve

Size: 284.2 acres

Ownership/Managing Entity

- Owned by Pima County Flood Control District
- Managed by the Nature Conservancy

Reserve Document

- None

Activities Allowed

- Hiking
- Passive and non-consumptive nature enjoyment
- Bird watching
- Nature photography
- Hunting (only with written permission from Nature Conservancy)
- Environmental education

Known or Potential Biological Impact Areas and/or Activities

- None known--restoration occurring in abandoned agricultural fields.

Priority Vulnerable Species

- Lowland leopard frog (*Rana yavapaiensis*)
- Southwestern willow flycatcher (*Empidonax traillii extimus*)

Candidates for Reestablishment

-

Potentially Problematic Species

- Bullfrog
- Feral pig
- Bermuda grass
- Sunflowers
- Johnson grass
- Tamarisk
- Gopher

Control of non-indigenous species includes plowing abandoned agricultural fields, applying

spot herbicides, and replanting with native grasses and trees. For a more complete list of potentially problematic species, reference the report, Issues of Non-Native Species in Public Reserves, July 2000.

Baseline Information

- *Detailed vegetation map:* Yes
- *Plant inventory:* Incomplete list
- *Animal inventory:* Bird list
- *Water (inventory water sources-location and permanency):* No surface water monitoring.

GAP Status

- Status 3a

Bingham Cienega is managed to protect and enhance biodiversity. The legal protection offered by the Management Agreement between The Nature Conservancy and the Pima County Flood Control District Board of Supervisors is not permanent, covering a term of 25 years, beginning in 1989. Permanent, legal protection of the Preserve would allow for a higher GAP status placement.

Management (Bingham Cienega Management Plan, 1992)

The management of the preserve is guided by three primary documents: the Management Agreement; the Conservation Easement; and the Irrigation Easement. The overall management goals of the Preserve are to protect, preserve, and enhance riparian and aquatic habitat. The goals are to be met by maintaining and restoring natural processes, native species, and ecological processes, including fire.

Management Agreement: The Management Agreement between The Nature Conservancy and the Pima County Flood Control District was approved by the County Board of Supervisors on March 7, 1989. This agreement states that the Preserve will be managed by the Nature Conservancy and the Bingham Cienega will be maintained to protect, preserve, and restore riparian and aquatic habitat and other natural values. A management plan for the Preserve was prepared September 8, 1992.

The Conservation Easement: Jack and Lois Kelly own an 19 acre inholding within the Preserve. Upon selling the 284 acres to Pima County, the Kelly's signed a Conservation Easement with the Nature Conservancy. This easement restricts uses on the Kelly tract which may be incompatible with the management of the Preserve.

The Irrigation Easement: On the 19 acre inholding, the Kelly's maintain an irrigation system including a well, underground pipe, and canals. The easement was granted by the Kelly's to the County, allowing the County access to and use of the irrigation system. The use of irrigation may aid in restoration and management of the Preserve.

Fire Management Plan: In 1995, the Nature Conservancy issued a Fire Management Plan for the Bingham Cienega Preserve. The objectives from this plan include: to exclude fire from the inholding; exclude fires from the mesquite bosque and forested wetlands community to encourage closed canopy stands; and to create and maintain openings in the emergent wetlands. Prescribed burning is recommended when cover of open water falls below 5 percent.

Fire Management Goals: There are three primary goals to the Preserve's fire management plan. 1) To reintroduce fire to emergent vegetation; 2) to accelerate development of the mesquite bosque adjacent to the wetland; 3) to protect people and property in the inholding. The specific objective of the fire management plan is to maintain patches of open water, totaling 5 to 50 percent of the emergent wetland area.

Fire Monitoring Recommendations: The efficacy of fires in creating openings in the emergent wetland will be assessed via periodic visual estimates of open water and photographs at permanent photo points. Periodic visual assessments, coupled with aerial photos every three years will be used to assess development of the abandoned agricultural fields into mesquite bosques.

Restoration (Bingham Cienega Restoration Plan, 1998)

Bingham Cienega Restoration Plan: The Bingham Cienega Natural Preserve Restoration Plan was prepared for the Arizona Water Protection Fund in 1998. The goal of this plan is to restore three plant communities: the mixed broad-leaf riparian forest; sacaton grassland; and mesquite woodland (bosque).

Management Objective: The objective of the Restoration Plan is to restore native vegetation to abandoned agricultural fields, increasing density and diversity of native plants and animal species.

Monitoring (Bingham Cienega Restoration Plan, 1998)

Bingham Cienega Monitoring Plan: The Monitoring Plan includes three plans for monitoring vegetation, bird use, and depth-to-groundwater.

Deciduous Riparian Woodland: The project objective is to plant 11 acres with deciduous riparian trees and shrubs using poles and container plants. Target species include Goodding willow, Fremont cottonwood, netleaf hackberry, Arizona walnut, velvet ash, and buttonbush. The monitoring objectives include: 1) to estimate the percent survivorship of cottonwood and willow poles and container plants from the time of transplanting until the second growing season;

2) to estimate the frequency of herbivory on poles and transplanted container plants, and to qualitatively describe the extent of damage on target species from the time of transplanting until the second growing season;

3) to determine how gopher cages and stem wrapping affect survivorship, occurrence of herbivory, and the extent of damage to Arizona ash from the time of transplanting until the second growing season.

Mesquite Woodlands: The mesquite woodland planting project objectives are to: 1) reestablish 16 acres of mesquite bosque, using container plantings or livestock to augment natural recruitment, if necessary; 2) to evaluate container planting and livestock grazing as techniques for enhancing mesquite establishment; 3) to evaluate thinning as a technique to promote rapid mesquite growth. The monitoring objectives include:

1) To determine the change in density of mesquite seedlings after livestock fed on mesquite beans are introduced to an enclosed area, and to compare the grazed area to change in mesquite seedling density in an ungrazed area over same period of time.

2) To determine survivorship of container-grown mesquite saplings from transplanting until the end of the first season.

3) To determine the survivorship and growth rate of mesquite saplings in thinned versus unthinned areas over two growing seasons.

Sacaton Grasslands: The sacaton grassland project objective is to plant 23 acres with sacaton using greenhouse grown plants in two sizes. The monitoring objectives include:

1) To estimate the percent survivorship of irrigated versus non-irrigated plants grown in 8.5" and 3" pots at two different depths to groundwater (1 meter versus 2 meters).

2) To estimate the vigor of irrigated versus non-irrigated plants grown in 8.5" and 3" pots at two different depths to groundwater (1 meter versus 2 meters).

3) To estimate the percent survivorship and vigor of irrigated sacaton in 3" pots over two growing seasons.

Bird Monitoring: The project objective is to determine bird use in the restoration area and to track changes in use over time as a means of evaluating the success of the restoration effort. The monitoring objective is to determine the number of birds by species foraging in or traveling through the nine permanent monitoring stations at a quarterly frequency throughout the funded project.

Groundwater Depth and Precipitation Monitoring: The project objective is to monitor precipitation and depth to groundwater throughout the restoration effort so that some conclusions may be drawn regarding the effectiveness of revegetation and site conditions. The monitoring objectives include:

- 1) To measure monthly precipitation during the funded project period;
- 2) To measure the depth to groundwater monthly in a network of observation wells during the funded project period.

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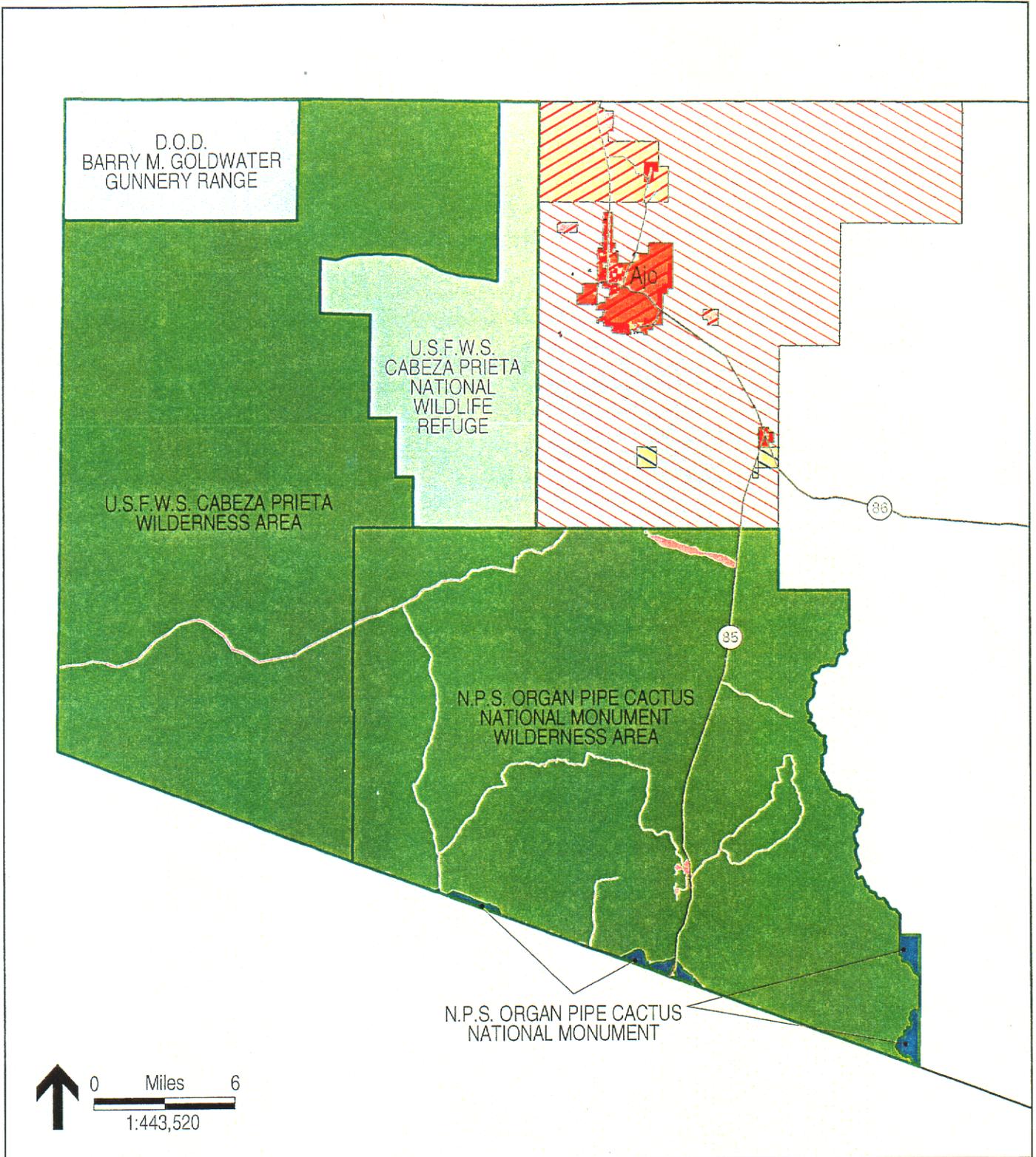
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APPENDIX D



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Western Pima County Reserve Management Area

- Reserve Management Area Components
-  Existing Reserve Areas
 -  BLM Lands
 -  State Lands
 -  Private Lands
 -  Major Road or Highway

- Level of Threat
- Low ↓
-  1a
 -  1b
 -  2
 -  3a
 -  3b

- Conservation Status*
- Most Protected ↓
-  1a
 -  1b
 -  2
 -  3a
 -  3b

- High ↓
-  4a
 -  4b
 -  4c
 -  4e
 -  4f
 -  4x
- Least Protected

Figure 2

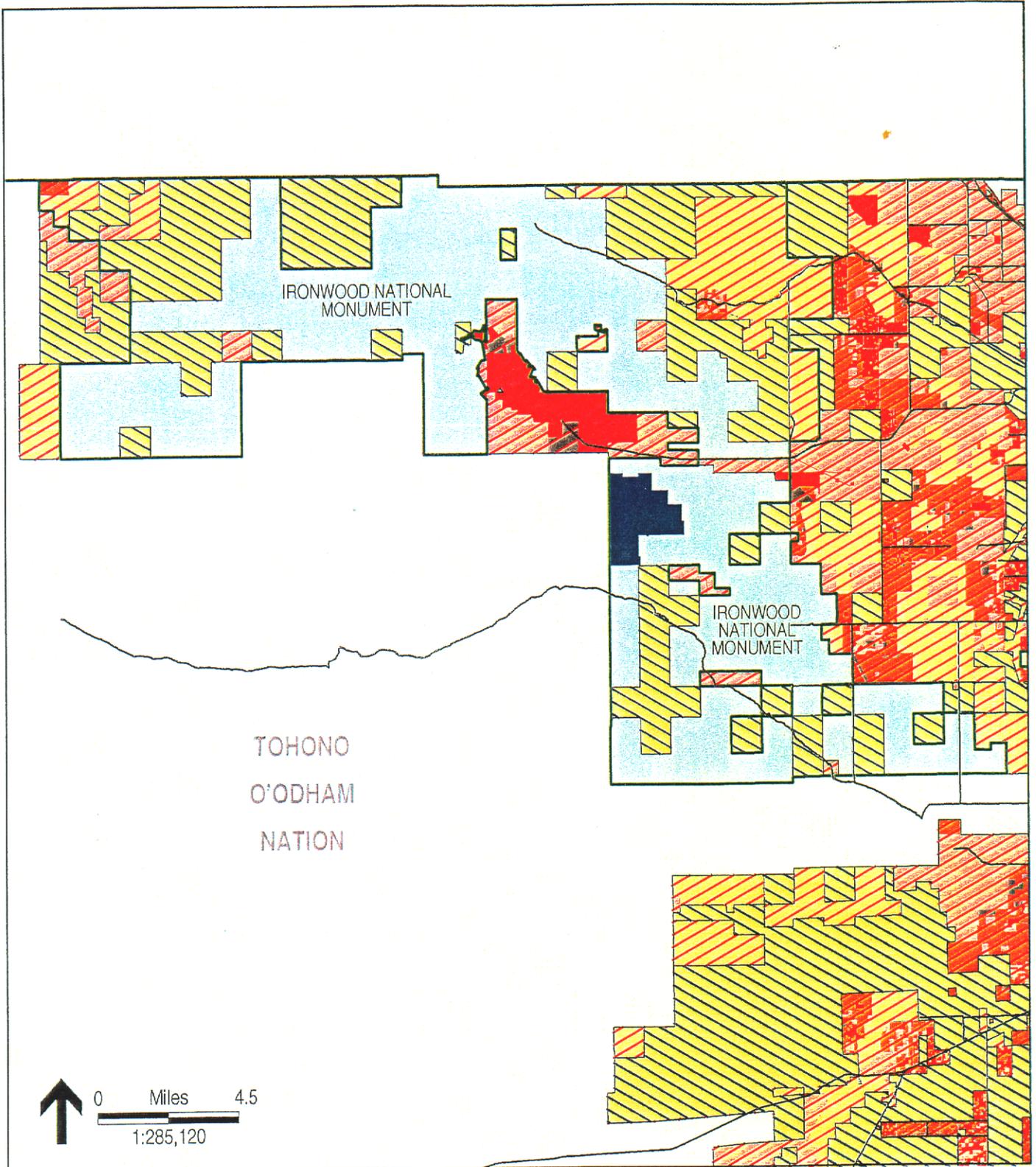
*(See Figure 1 for summary of conservation status definitions)

**APPENDIX D
MANAGEMENT ISSUES WITHIN EXISTING RESERVE AREAS**

Reserve Management Areas & Reserves	Conservation Status	Management Concerns & Issues of the Reserve Management Area	Potential Management Responses or Opportunities
Western Pima County Reserve Management Area			
Organ Pipe Cactus National Monument Wilderness	<p>1a. Wilderness areas are managed under the mandates provided in the Wilderness Act of 1964. The wilderness designation gives permanent, legal protection to land resources.</p>	<ul style="list-style-type: none"> • U.S./Mexico border- illegal crossings and patrol activities degrade and fragment habitat, spread invasive species, cause fires. • Increasing recreational use throughout, particularly dispersed and long-term camping (RV's and other) on BLM lands in vicinity of Ajo and expansion of Alamo campground in OPCNP 	<ul style="list-style-type: none"> • Interagency field coordination has been initiated (Oct. 2000) to address border issues and impacts • INS in process of developing an EIS for Border Patrol impacts. • Monitoring of recreation use and impacts. Evaluate existing conditions and consider use restrictions in order to protect or restore habitat in heavily used areas.
Organ Pipe Cactus National Monument	<p>2. OPCNM is heavily visited and Highway 85 runs N/S through the reserve. The monument has also has a visitor center and camp-grounds, with development plans for new facilities.</p>	<ul style="list-style-type: none"> • Military training activities and overhead flights disturbing bighorn sheep, Sonoran pronghorn, and other wildlife and plant communities. • Influx of invasive grasses have changed the fire regime- plant communities not resistant to higher temperatures of grass fires. • Increased visitors, uncontrolled use of trails and presence of non-native fish at Quitobaquito spring 	<ul style="list-style-type: none"> • Cabeza Prieta management plan calls for the closure of trails. Consider other trail and road closures. • Assess area-wide road and trail monitoring needs. • Evaluate status of research projects that assess impacts stemming from Military training activities and overhead flights
Cabeza Prieta National Wildlife Refuge and Cabeza Prieta Wilderness	<p>1b. The refuge and the wilderness have permanent protection and a mandated management plan committed to maintain a natural state within the reserve. Both the Cabeza Prieta Refuge and Wilderness have been placed in Status 1b due to military activities that may detract</p>	<ul style="list-style-type: none"> • Reopening of New Cornelia mine, influx of people into Ajo, increase in groundwater pumping • Potential for increased mining on BLM lands in vicinity of Ajo, resulting in habitat loss and alteration. • Livestock grazing on BLM lands in context of very arid, sparsely vegetated region. • Presence of mine adits and surrounding foraging 	<ul style="list-style-type: none"> • Inventory and monitoring of distribution of invasive grasses • Interagency research on fire ecology • Monitoring visitor use of Quitobaquito Spring, Alamo Campground Adit, and other biologically sensitive locations. • Research program for non-native aquatic species at Quitobaquito spring

**APPENDIX D
MANAGEMENT ISSUES WITHIN EXISTING RESERVE AREAS**

Reserve Management Areas & Reserves	Conservation Status	Management Concerns & Issues of the Reserve Management Area	Potential Management Responses or Opportunities
<p>Western Pima County, cont.</p> <p>Barry M. Goldwater Gunnery Range</p> <p>BLM Lands</p> <p>State Lands</p> <p>Private Lands</p> <p>Ranch Lands</p>	<p>from the quality of land.</p> <p>3b. The gunnery range is used as aerial target practice.</p>	<p>habitat for largest known maternity colony of LLN Bat.</p> <ul style="list-style-type: none"> • Roadkill along N/S State Highway 85 • Wildlife “drinkers” within CPNWR • Inadequate supervision and monitoring of visitor use. 	<ul style="list-style-type: none"> • Research and monitoring of groundwater levels, especially in vicinity of Ajo and in shallow groundwater areas. • Establish dialogue with New Cornelia Mine operators to mitigate habitat loss that may be associated with reopening. • Reevaluate livestock grazing on BLM lands; monitor range condition • Monitor mine adits use by LLN Bats. • Implement protective measures to minimize roadkill (esp. pronghorn and reptiles) • Research program on use and impacts of wildlife “drinkers” • Develop grazing management plans, more tailored to the sparsely vegetated landscape • Closely monitor range condition.



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Ironwood / Avra Valley Reserve Management Area

- Reserve Management Area Components**
- Existing Reserve Areas
 - BLM Lands
 - State Lands
 - Private Lands
 - Major Road or Highway

- Level of Threat**
- Low
- High

- Conservation Status***
- Most Protected
- Least Protected
- 1a
 - 1b
 - 2
 - 3a
 - 3b
 - 4a
 - 4b
 - 4c
 - 4e
 - 4x

Figure 3

*(See Figure 1 for summary of conservation status definitions)

**APPENDIX D
MANAGEMENT ISSUES WITHIN EXISTING RESERVE AREAS**

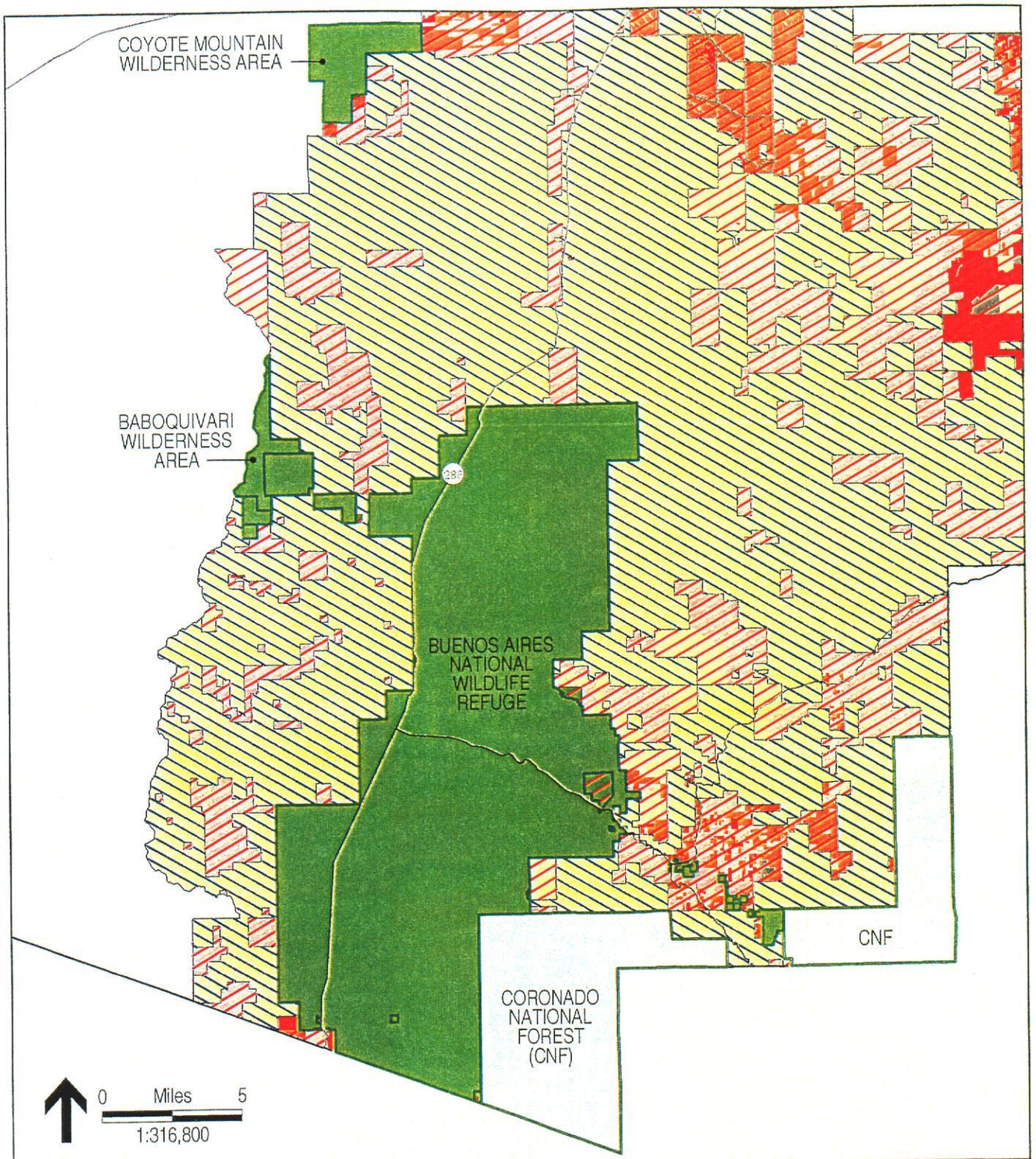
Reserve Management Areas & Reserves	Conservation Status	Management Concerns & Issues of the Reserve Management Area	Potential Management Responses or Opportunities
Ironwood/Avra Valley Reserve Management Area			
Ironwood National Monument (Including Waterman Mts. ACEC and Silverbell Mts. RCA)	2. The newly created monument is permanently protected but does not yet have a management plan. An interim plan is being developed. Meanwhile the BLM's Phoenix Resource Management Plan stays in effect. The GAP status may change once the new plan is developed.	<ul style="list-style-type: none"> Exponential growth in residential development, much of which is unregulated and in vicinity of Brawley Wash floodplain. High potential for conversion of ranches to higher intensity uses with resulting decrease in ability to manage open space on a landscape scale. Increasing recreational use throughout, particularly ORV use on numerous jeep trails. Presence of high density Ironwood forest community. Impacts to Nichol's Turk's head and vegetative cover due to ORV use and conversion. Inadequate supervision and monitoring of visitor use. Population of bighorn sheep and presence of "lambing area" at Ragged Top. Shallow groundwater area east of Silver Bell mine. Status of mining potential in the Silverbell Mts. Area. Proposed high voltage transmission corridor N/S through valley. Presence and spread of invasive grasses and non-native plants have changed the fire regime-plant communities not resistant to higher temperatures of grass fires. 	<ul style="list-style-type: none"> Coordinate the Ironwood Monument Management Plan with management and species goals of the SDCP. Develop a range of cooperative agreements to facilitate continued ranching as a viable land use. Work with NRCDC on watershed improvement projects. Research, monitoring and public education program for bighorn sheep Monitoring of groundwater levels and quality at Silver Bell mine area. Inventory and monitoring of distribution of invasive grasses. Research opportunities for restoration of native grasses and other plants on Tucson Water's abandoned agricultural fields. Potential use as "grass banks" Public education program to further promote the use of effluent and CAP water for agricultural use. Identify and evaluate opportunities for providing landscape scale connections to Tucson Mountains area. Consider retention of ranchlands as logical corridors
Other BLM Lands			
State Lands			
Private Lands			
Ranch Lands			

**APPENDIX D
MANAGEMENT ISSUES WITHIN EXISTING RESERVE AREAS**

Reserve Management Areas & Reserves	Conservation Status	Management Concerns & Issues of the Reserve Management Area	Potential Management Responses or Opportunities
Ironwood/Avra Valley, cont.		<ul style="list-style-type: none"> • Tucson Water abandoned agricultural fields have been a source of invasive grasses and non-native plants. • Use of groundwater for agricultural use. • Need for valley floor connections/corridors to Tucson Mountains and south into Altar Valley. • Proposed high voltage transmission corridor N/S through valley. • Wildcat dumping occurs on Monument lands and throughout the area. • Theft of cacti and reptiles is a serious management concern. 	<ul style="list-style-type: none"> • Consider land use policies that promote regulated growth and development over unregulated growth. • Track the planning and impact assessment of the proposed transmission corridor. • Evaluate success of mine restoration/revegetation projects. • Conduct a survey of ongoing monitoring projects. • Evaluation of trails and roads to identify possible redundancies and closure possibilities. • Research and monitoring study of presence of domestic pets and degree of disturbance to wildlife. • Inventory and monitoring of distribution of invasive grasses, non-native plants and wildlife species. • Monitoring of recreation use and impacts. Evaluate existing conditions and consider use restrictions in order to protect or restore habitat in heavily used areas. • Consider opportunities to increase staffing and share on-the-ground visitor monitoring responsibilities.

**APPENDIX D
MANAGEMENT ISSUES WITHIN EXISTING RESERVE AREAS**

Reserve Management Areas & Reserves	Conservation Status	Management Concerns & Issues of the Reserve Management Area	Potential Management Responses or Opportunities
Ironwood/Avra Valley, cont.			<ul style="list-style-type: none"> • Develop grazing management plans, more tailored to the sparsely vegetated landscape • Closely monitor range condition



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Altar Valley Reserve Management Area

- Reserve Management Area Components
- Existing Reserve Areas
 - BLM Lands
 - State Lands
 - Private Lands
 - Major Road or Highway

- Level of Threat
- Low ↓
- 1a
 - 1b
 - 2
 - 3a
 - 3b
- ↓
- High

- Conservation Status*
- Most Protected ↓
- 1a
 - 1b
 - 2
 - 3a
 - 3b
- ↓
- Least Protected

- 4a
- 4b
- 4c
- 4e
- 4f
- 4x

Figure 4

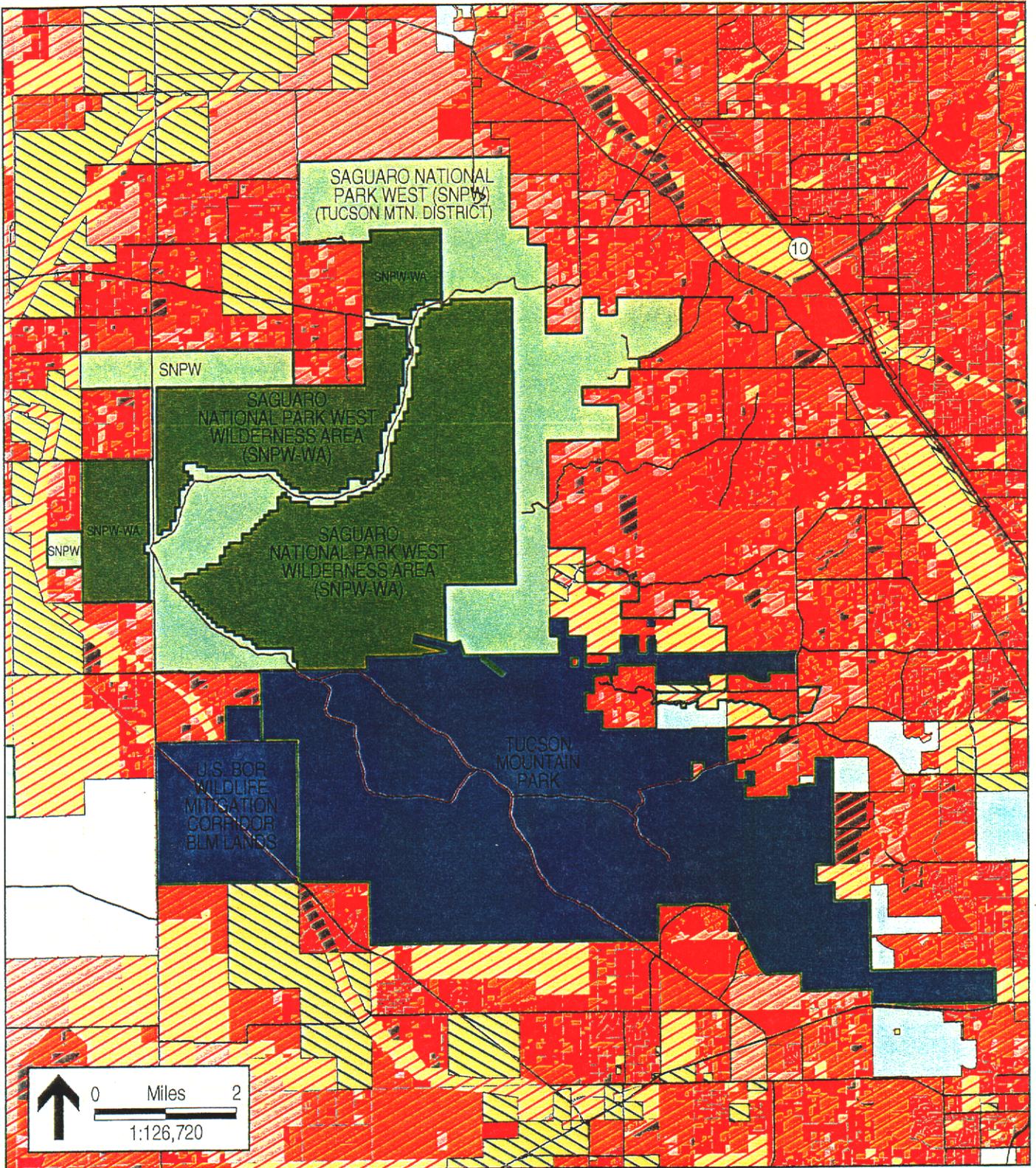
*(See Figure 1 for summary of conservation status definitions)

**APPENDIX D
MANAGEMENT ISSUES WITHIN EXISTING RESERVE AREAS**

Reserve Management Areas & Reserves	Conservation Status	Management Concerns & Issues of the Reserve Management Area	Potential Management Responses or Opportunities
Altar Valley Reserve Management Area			
Buenos Aires National Wildlife Refuge	<p>1a. BANNER does not have an official management plan. However, as part of the National Wildlife Refuge System, the reserve management is in accordance with the National Wildlife Refuge Administration Act and Executive Order 12996.</p>	<ul style="list-style-type: none"> • U.S./Mexico border- illegal crossings and patrol activities degrade and fragment habitat, spread invasive species, cause fires. • Residual impacts from historic overgrazing and drought. • Increasing recreational use throughout, particularly dispersed camping. • High potential for conversion of ranches to higher intensity uses with resulting decrease in ability to manage open space on a landscape scale. 	<ul style="list-style-type: none"> • Design research and monitoring studies to evaluate groundwater levels in the vicinity of Arivaca Creek. • Consider need and viability of continued grazing within Wilderness areas. • Develop a range of cooperative agreements to facilitate continued ranching as a viable land use. • Work with NRCD on watershed improvement projects.
Baboquivari Wilderness Area	<p>1a. Wilderness areas are managed under the mandates provided in the Wilderness Act of 1964. The wilderness designation gives permanent, legal protection to land resources. A Draft Management plan for these Wildernesses is due during 2001.</p>	<ul style="list-style-type: none"> • Influx of invasive grasses have changed the fire regime- plant communities not resistant to higher temperatures of grass fires. • Grazing occurs within the Baboquivari Wilderness and a lease is available on the Coyote Mt. Wilderness. Grazing in and near the Wilderness may provide a pathway for non-indigenous invasive grasses and other plants. • Grassland wildfires are a concern; controlled burns can be used as an effective range management tool. • Ranchers' inability to utilize controlled fires as a range management technique due to restrictions relating to the endangered Pima pineapple cactus. 	<ul style="list-style-type: none"> • Support projects identified by the Altar Valley Resource Assessment, such as: • Identify changes in grazing management and/or structures necessary to implement grazing system changes (e.g., water developments or fencing) • Identify and implement projects to reduce occurrence of invasive species such as snakeweed and burroweed, or reduce mesquite densities.
Coronado National Forest Lands (Unreserved)	<p>3b. Subject to a management plan. Allows logging, mining, other uses potentially detrimental to preserve natural resources.</p>	<ul style="list-style-type: none"> • Identify and implement soil erosion projects and install erosion control structures. • Other potential stewardship projects such as firebreaks, water developments, 	<ul style="list-style-type: none"> • Identify and implement soil erosion projects and install erosion control structures. • Other potential stewardship projects such as firebreaks, water developments,

**APPENDIX D
MANAGEMENT ISSUES WITHIN EXISTING RESERVE AREAS**

Reserve Management Areas & Reserves	Conservation Status	Management Concerns & Issues of the Reserve Management Area	Potential Management Responses or Opportunities
Altar Valley, cont.	The 1986 Forest Management Plan will need to be revised and in the near future. USFS anticipates issuing a Notice of Intent to initiate that update by 9/2002	<ul style="list-style-type: none"> • Competition and predation by invasive and non-native species in Arivaca Lake and creek. • Ability to retain adequate surface flows and groundwater levels to support the Arivaca Creek and Cienega, given allowed levels of groundwater withdrawal. • Effect of dam at Arivaca Lake • Potential for expanded mining activities in Coronado Nat'l. Forest lands south of Arivaca, on the BANWRA, and on BLM lands. State and deeded lands also have potential for increased mining activities. • Proposed high voltage transmission corridor N/S through valley. 	<p>brush management, rangeland seeding, prescribed burning, deferred grazing or different grazing systems.</p> <ul style="list-style-type: none"> • Assess the benefits/consequences associated with eliminating the dam at Arivaca Lake. • Support efforts to develop a long-term solution to non-native aquatic species overwhelming native frogs, fish and snakes at Arivaca Lake and Cienega. • Develop and implement a program to address crayfish, bullfrogs and other non-native aquatic species. • Track the planning and impact assessment of the proposed transmission corridor. • Conduct stock tanks surveys to identify management needs or modifications required to maintain or restore habitat for native fish and frogs. • Support efforts to design and implement a native frog conservation and reestablishment (in cooperation with BANWR, AG&F and area ranchers.)
BLM Lands			
State Lands			
Private Lands			
Ranch Lands			



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Tucson Mountains Reserve Management Area

- Reserve Management Area Components**
- Existing Reserve Areas
 - BLM Lands
 - State Lands
 - Private Lands
 - Major Road or Highway

- Level of Threat**
- Low
- ↓
- High

- Conservation Status***
- 1a Most Protected
- 1b
- 2
- 3a
- 3b
- ↓
- 4a
- 4b
- 4c
- 4f
- 4x Least Protected

Figure 5

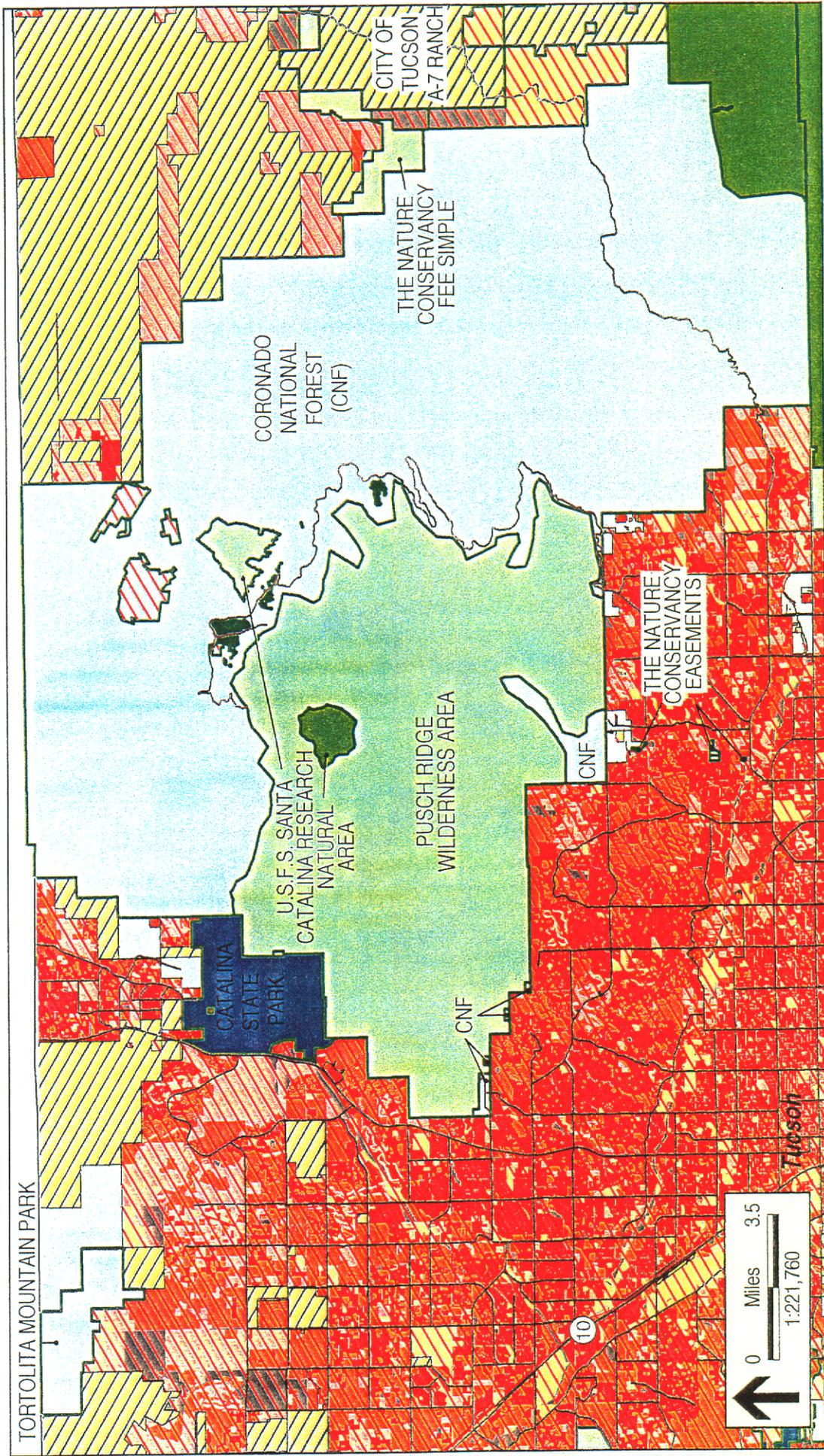
*(See Figure 1 for summary of conservation status definitions)

**APPENDIX D
MANAGEMENT ISSUES WITHIN EXISTING RESERVE AREAS**

Reserve Management Areas & Reserves	Conservation Status	Management Concerns & Issues of the Reserve Management Area	Potential Management Responses or Opportunities
Tucson Mountains Reserve Management Area			
Saguaro National Park Wilderness	<p>1a. Wilderness areas are managed under the mandates provided in the Wilderness Act of 1964. The wilderness designation gives permanent, legal protection to land resources.</p>	<ul style="list-style-type: none"> • Exponential growth in residential development, much of which is unregulated and/or encroaching into perimeter adjacent lands. • High amount of traffic on SNP and TMP roads; air pollution and traffic noise, road-killed wildlife. • Presence of domestic dogs and cats. • Influx of invasive grasses have changed the fire regime- plant communities not resistant to higher temperatures of grass fires. • Presence and spread of invasive and exotic plants and wildlife species. • Increasing recreational use throughout. • Resource damage from "wildcat" trails and park access. • Presence of high density Ironwood forest community. • Inadequate supervision and monitoring of visitor use. • Presence and spread of invasive grasses and non-native plants have changed the fire regime- plant communities not resistant to higher temperatures of grass fires. • Increasing demands on groundwater. 	<ul style="list-style-type: none"> • Continue to pursue opportunities for land acquisitions and expansions to SNP and TNP boundaries. • Fund the purchase of lands within SNP boundaries that are currently owned by others. • Evaluation of trails and roads to identify possible redundancies and closure possibilities. • Research and monitoring study of presence of domestic pets and degree of disturbance to wildlife. • Inventory and monitoring of distribution of invasive grasses, non-native plants and wildlife species. • Monitoring of recreation use and impacts. Evaluate existing conditions and consider use restrictions in order to protect or restore habitat in heavily used areas.
Saguaro National Park (Tucson Mtn. District)	<p>1b. Saguaro National Park is permanently protected and has a mandated management plan. Both areas outside the wilderness areas are heavily visited and have visitor centers.</p>	<ul style="list-style-type: none"> • Presence of high density Ironwood forest community. • Inadequate supervision and monitoring of visitor use. • Presence and spread of invasive grasses and non-native plants have changed the fire regime- plant communities not resistant to higher temperatures of grass fires. • Increasing demands on groundwater. 	<ul style="list-style-type: none"> • Research and monitoring study of presence of domestic pets and degree of disturbance to wildlife. • Inventory and monitoring of distribution of invasive grasses, non-native plants and wildlife species. • Monitoring of recreation use and impacts. Evaluate existing conditions and consider use restrictions in order to protect or restore habitat in heavily used areas.
Tucson Mountain Park	<p>1b. The Tucson Mountain Park is bisected with roads and heavily used trails. Two commercial enterprises are also located in the Park.</p>	<ul style="list-style-type: none"> • Presence of high density Ironwood forest community. • Inadequate supervision and monitoring of visitor use. • Presence and spread of invasive grasses and non-native plants have changed the fire regime- plant communities not resistant to higher temperatures of grass fires. • Increasing demands on groundwater. 	<ul style="list-style-type: none"> • Research and monitoring study of presence of domestic pets and degree of disturbance to wildlife. • Inventory and monitoring of distribution of invasive grasses, non-native plants and wildlife species. • Monitoring of recreation use and impacts. Evaluate existing conditions and consider use restrictions in order to protect or restore habitat in heavily used areas.
The U.S. BOR Wildlife Mitigation Corridor BLM Lands	<p>2. This small reserve is intended for use as a CAP canal crossing for wildlife. The CAP canal bisects</p>	<ul style="list-style-type: none"> • Presence of high density Ironwood forest community. • Inadequate supervision and monitoring of visitor use. • Presence and spread of invasive grasses and non-native plants have changed the fire regime- plant communities not resistant to higher temperatures of grass fires. • Increasing demands on groundwater. 	<ul style="list-style-type: none"> • Research and monitor water use and water conservation demonstration projects at Old Tucson, and Arizona Sonora Desert Museum. • Conduct a survey of the various ongoing biological research and

**APPENDIX D
MANAGEMENT ISSUES WITHIN EXISTING RESERVE AREAS**

Reserve Management Areas & Reserves	Conservation Status	Management Concerns & Issues of the Reserve Management Area	Potential Management Responses or Opportunities
Tucson Mts., cont. State Lands Private Lands Ranch Lands	(underground) the mitigation corridor.		monitoring projects.



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Catalina Mountains / Tortolitas Reserve Management Area



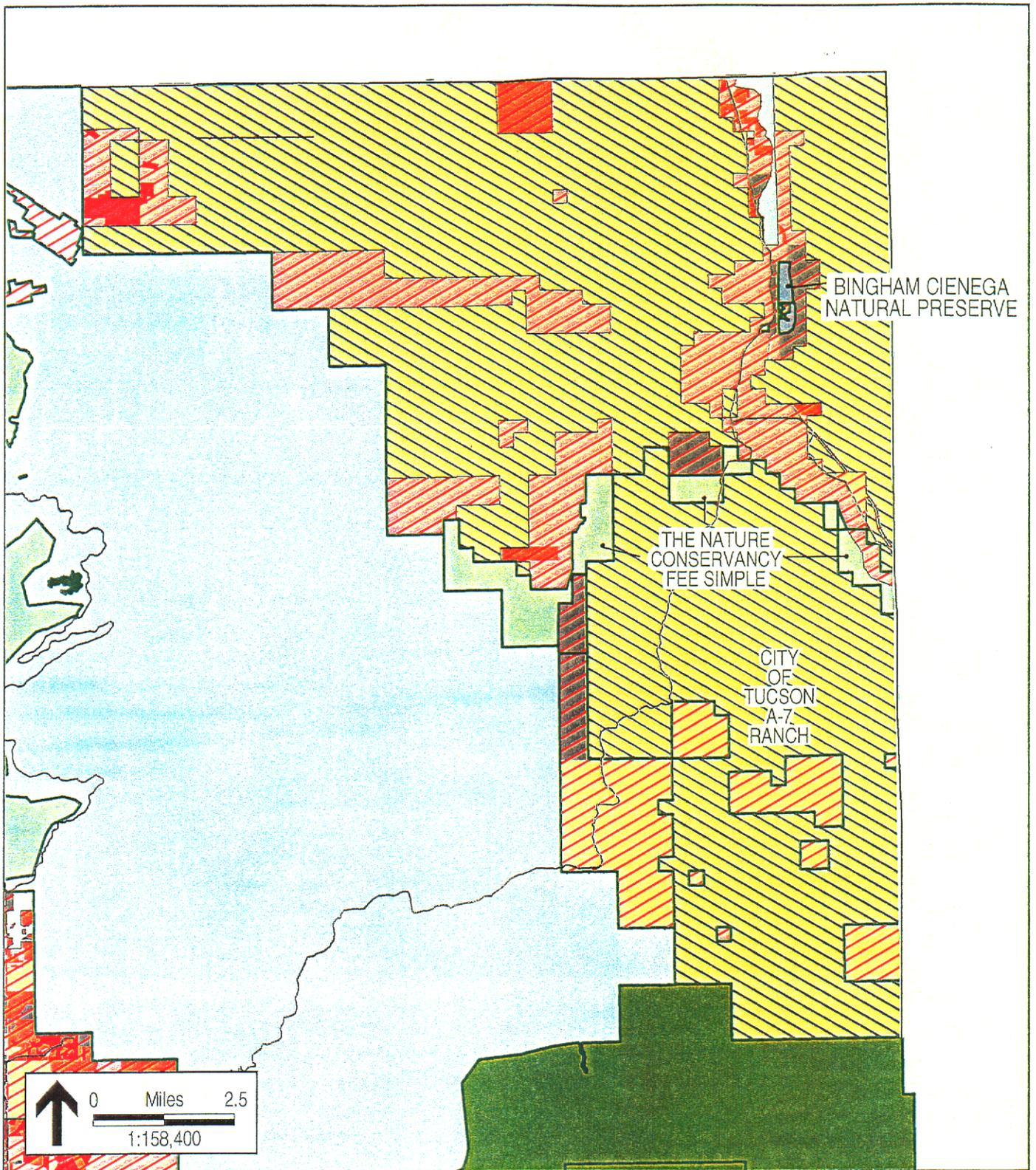
Figure 6

APPENDIX D
MANAGEMENT ISSUES WITHIN EXISTING RESERVE AREAS

Reserve Management Areas & Reserves	Conservation Status	Management Concerns & Issues of the Reserve Management Area	Potential Management Responses or Opportunities
Catalina/Tortolita Reserve Management Area			
USFS Santa Catalina Research Natural Area	1a. RNA's are managed for wilderness values and uses while providing opportunities for non-disruptive research and education. Use restrictions may be imposed as necessary.	<ul style="list-style-type: none"> • Increasing recreational use throughout, particularly of dispersed recreation; human use and overuse • Inadequate supervision and monitoring of visitor use in certain areas • USFS mandate to manage for multiple uses, which at times conflict and impact flora and fauna • Habitat loss, alteration and degradation • Loss or near loss of bighorn sheep habitat at Pusch Ridge. • Private and State lands adjacent to the Catalina and Tortolita Mountains are subject to increasing development pressure, including some parcels identified by the Open Space Master Plan • Projected population forecasts increased growth in the Tortolita fan area, much of which is designated Critical Habitat for the CFPO. • Decline in groundwater levels and stream surface flows • Continued groundwater pumping in remaining areas of shallow ground water, especially in the Tanque Verde area and the Sabino Creek watershed 	<ul style="list-style-type: none"> • Coordinate the update for the Coronado NF Management Plan with management and species goals of the SDCP. • Balance opportunities for increased recreation with resource capabilities. • Inventory, protect and manage cave resources. Identify and build partnerships with caving organizations, scientists and recreationists. • Manage wilderness areas to preserve and protect the wilderness character. • Evaluate need for increased supervision and monitoring of visitor use in high-use or high-impact areas. • Evaluate need for increased monitoring of resource conditions and visitor use in Wilderness. • Identify range and forest restoration or enhancement opportunities. • Continue studies and monitoring of fire impacts, both controlled and wildfires. • Consider land use policies that provide incentives for development outside of CFPO Critical Habitat. • Continue to pursue a cooperative partnership with the State Land
USFS Butterfly Research Natural Area	1b. The Pusch Ridge Wilderness is located near a metropolitan area and is heavily used by visitors.		
Coronado National Forest (Unreserved)	3b. Subject to a management plan. Allows logging, mining, other uses potentially detrimental to preserve natural resources. The 1986 Forest Management Plan will need to be revised and in the near future. USFS anticipates issuing a Notice of Intent to initiate that update by 9/2002.		

**APPENDIX D
MANAGEMENT ISSUES WITHIN EXISTING RESERVE AREAS**

Reserve Management Areas & Reserves	Conservation Status	Management Concerns & Issues of the Reserve Management Area	Potential Management Responses or Opportunities
Catalina/Tortolita, cont.		<ul style="list-style-type: none"> • Decline in stands of mixed riparian and xeroriparian woodlands • Planned extension of the CAP line E/W across the Tortolita fan • Competition and predation by invasive species, particularly at the urban fringes; increased potential for diseases in biotic communities • Competition and predation by invasive aquatic species 	<p>Department with regard to the reclassification of lands for conservation.</p> <ul style="list-style-type: none"> • Pursue opportunities for sensitive lands acquisitions, including expanding Catalina State Park, Tortolita Mt. Park as identified by the Open Space Plan. • Work with USFS and AG&F to design and implement a program to remove green sunfish and other exotic fish from key watersheds where they prevent native fish conservation. • Research and design a program to introduce or reestablish native fish, frogs, and snakes.
Catalina State Park	<p>2. Over 5 % of the park is developed (land owned by USFS and leased to the State)</p>		
Agua Caliente County Park	<p>3a. Has a Master Plan, but is not subject to permanent protection or a management plan.</p>		
Tortolita Mountain Park			
BLM Lands			
State Lands			
Private Lands			
Ranch Lands			
City of Tucson A-7 Ranch	<p>3b. The A7 ranch will be used as a grass bank</p>		



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San Pedro Valley Reserve Management Area

Reserve Management Area Components

-  Existing Reserve Areas
-  BLM Lands
-  State Lands
-  Private Lands
-  Major Road or Highway

Level of Threat

Low
↓
High

Conservation Status*

1a Most Protected
1b
2
3a
3b

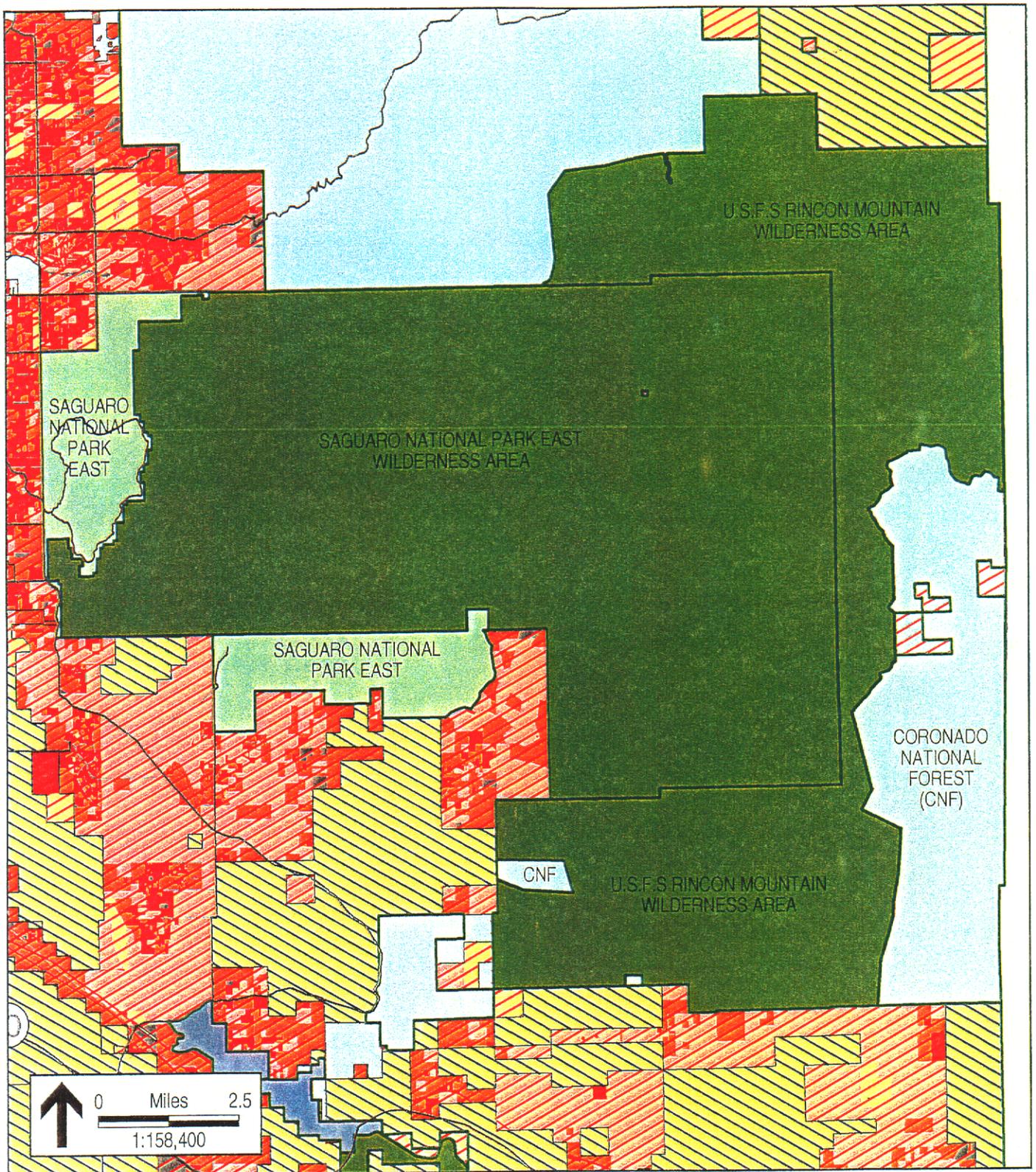
4a
4b
4c
4e
4f Least Protected
4x

Figure 7

*(See Figure 1 for summary of conservation status definitions)

**APPENDIX D
MANAGEMENT ISSUES WITHIN EXISTING RESERVE AREAS**

Reserve Management Areas & Reserves	Conservation Status	Management Concerns & Issues of the Reserve Management Area	Potential Management Responses or Opportunities
San Pedro Valley Reserve Management Area			
Bingham Cienega Natural Preserve	3a. This reserve does not have permanent protection.	<ul style="list-style-type: none"> • Surface and groundwater flows that support the San Pedro riparian woodlands and cienega marshlands may be jeopardized by diversions and increased groundwater pumping for residential and agricultural use. 	<ul style="list-style-type: none"> • Work with private landowner(s) to eliminate diversion of San Pedro River. • Develop and implement a program to eliminate feral hogs.
Buehman Canyon (The Nature Conservancy)	1b. Mineral extraction is an issue in this area, because mineral rights are owned by others.	<ul style="list-style-type: none"> • Conversion of ranches and large agricultural properties to smaller lots. • Conversion of mesquite bosque and riparian grasslands to pastures that require supplemental irrigation. 	<ul style="list-style-type: none"> • Develop a range of cooperative agreements to facilitate continued ranching as a viable land use. • Work with NRCD on watershed improvement projects.
BLM Lands		<ul style="list-style-type: none"> • Potential for mining in tributary canyons of the San Pedro, particularly the Buehman Canyon. 	<ul style="list-style-type: none"> • Research the possibility of purchase of mining rights in Buehman Canyon and other sensitive areas.
State Lands		<ul style="list-style-type: none"> • Presence of feral hogs, and non-native fish and frogs. 	<ul style="list-style-type: none"> • Consider land acquisitions of properties along the San Pedro riparian corridor.
Private Lands		<ul style="list-style-type: none"> • Road widenings and improvements if implemented in the future, would increase traffic to the area and consequent increases in population. 	<ul style="list-style-type: none"> • Develop and implement a program for further establishing native fish & frogs.
Ranch Lands			<ul style="list-style-type: none"> • Work with TNC in support of activities to maintain and improve existing aquatic and riparian communities. • Investigate and monitor groundwater levels and quality along the San Pedro. • Identify strategies to reduce rate of current pumping. • Work with ASLD and lessees on opportunities for better management of State Lands.



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Rincon Mountains Reserve Management Area

Reserve Management Area Components

- Existing Reserve Areas
- BLM Lands
- State Lands
- Private Lands
- Major Road or Highway

Level of Threat

Low
↓
High

Conservation Status*

1a Most Protected
1b
2
3a
3b

4a
4b
4c
4e
4f Least Protected
4x

Figure 8

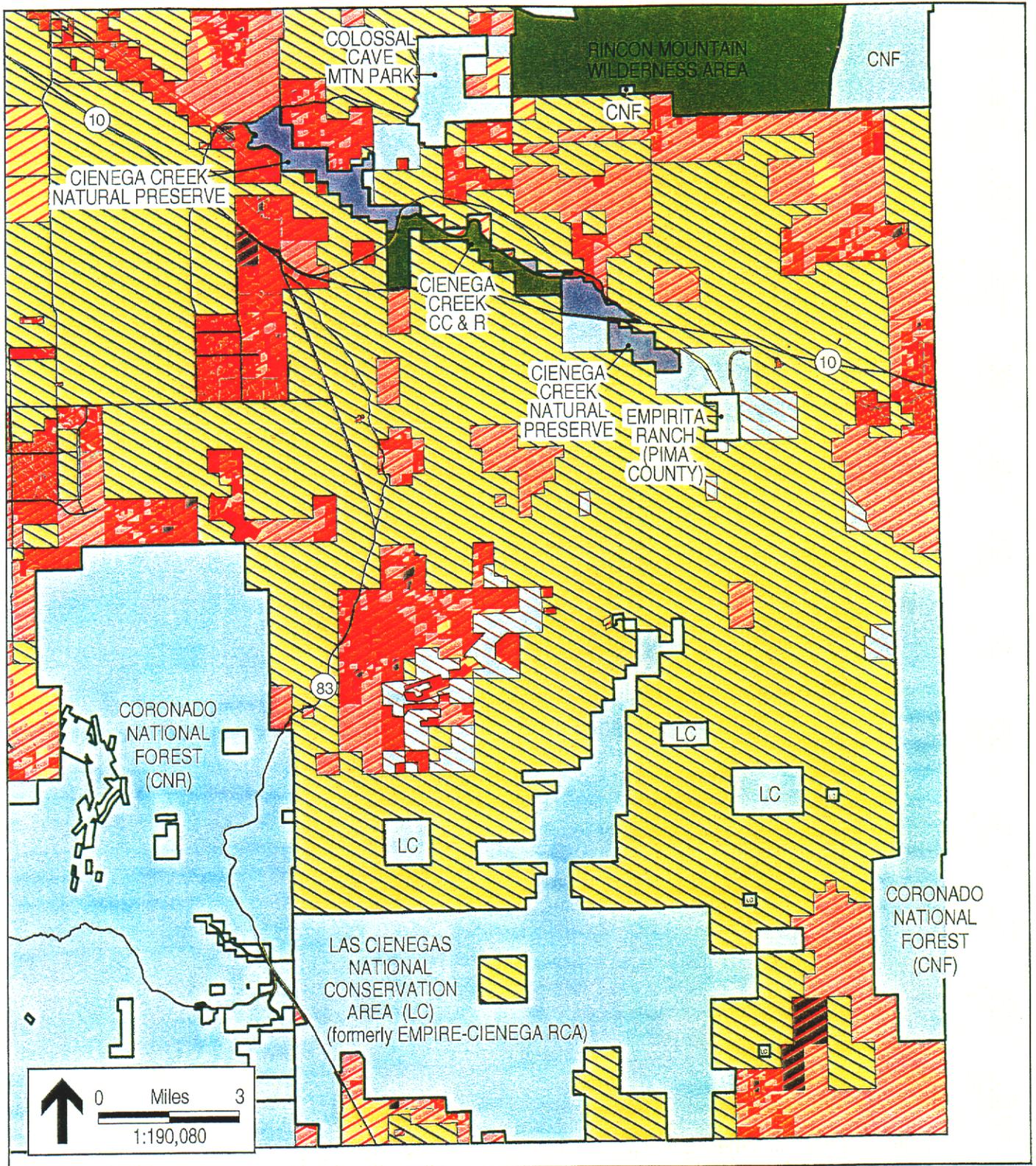
*(See Figure 1 for summary of conservation status definitions)

**APPENDIX D
MANAGEMENT ISSUES WITHIN EXISTING RESERVE AREAS**

Reserve Management Areas & Reserves	Conservation Status	Management Concerns & Issues of the Reserve Management Area	Potential Management Responses or Opportunities
Rincon Mountains Reserve Management Area			
USFS Rincon Mountain Wilderness	1a. Wilderness areas are managed under the mandates provided in the Wilderness Act of 1964. The wilderness designation gives permanent, legal protection to land resources.	<ul style="list-style-type: none"> • Increase in residential development on lands adjacent to reserve boundaries. • Area dependent upon groundwater, not served by existing or planned CAP infrastructure. • High amount of traffic on Old Spanish Trail, SNP roads and others; air pollution and traffic noise, road-killed wildlife. • Presence of domestic dogs and cats. • Presence and spread of invasive and exotic plants and wildlife species. • Influx of invasive grasses have changed the fire regime- plant communities not resistant to higher temperatures of grass fires. • Residual effects of historic overgrazing and drought as evidenced along Rincon Creek. • Increasing recreational use throughout, particularly dispersed recreation and unauthorized ORV use; human use and overuse • Inadequate supervision and monitoring of visitor use in certain areas. 	<ul style="list-style-type: none"> • Support Rincon Institute's research and restoration efforts for Rincon Creek. • Inventory and monitoring of distribution of invasive grasses • Support interagency research on fire ecology • Monitor recreation use and impacts. • Evaluate existing conditions and consider use restrictions in order to protect or restore habitat in heavily used areas.
Saguaro National Park East (Rincon Mnt. District)	1b. Saguaro National Park is permanently protected and has a mandated management plan. Areas outside the wilderness areas are heavily visited and have visitor centers.	<ul style="list-style-type: none"> • Evaluate need for increased supervision and monitoring of visitor use in high-impact areas. • Evaluate need for increased monitoring of resource conditions and visitor use in Wilderness. • Identify range and forest restoration or enhancement opportunities. • Continue studies and monitoring of fire impacts, both controlled and wildfires. 	
Coronado National Forest (Unreserved)	3b. Subject to a management plan. Allows logging, mining, other uses potentially detrimental to preserve natural resources. The 1986 Forest Management Plan will need to be revised and in the near future. USFS anticipates issuing a Notice of Intent to initiate that update by 9/2002.		

**APPENDIX D
MANAGEMENT ISSUES WITHIN EXISTING RESERVE AREAS**

Reserve Management Areas & Reserves	Conservation Status	Management Concerns & Issues of the Reserve Management Area	Potential Management Responses or Opportunities
Rincon Mts., cont. BLM Lands State Lands Private Lands Ranch Lands			



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Las Cienegas Reserve Management Area

- Reserve Management Area Components**
-  Existing Reserve Areas
 -  BLM Lands
 -  State Lands
 -  Private Lands
 -  Major Road or Highway

- Level of Threat**
- Low
↓
High
- Conservation Status***
- Most Protected
↓
Least Protected
-  1a
 -  1b
 -  2
 -  3a
 -  3b
 -  4a
 -  4b
 -  4c
 -  4e
 -  4x

Figure 9

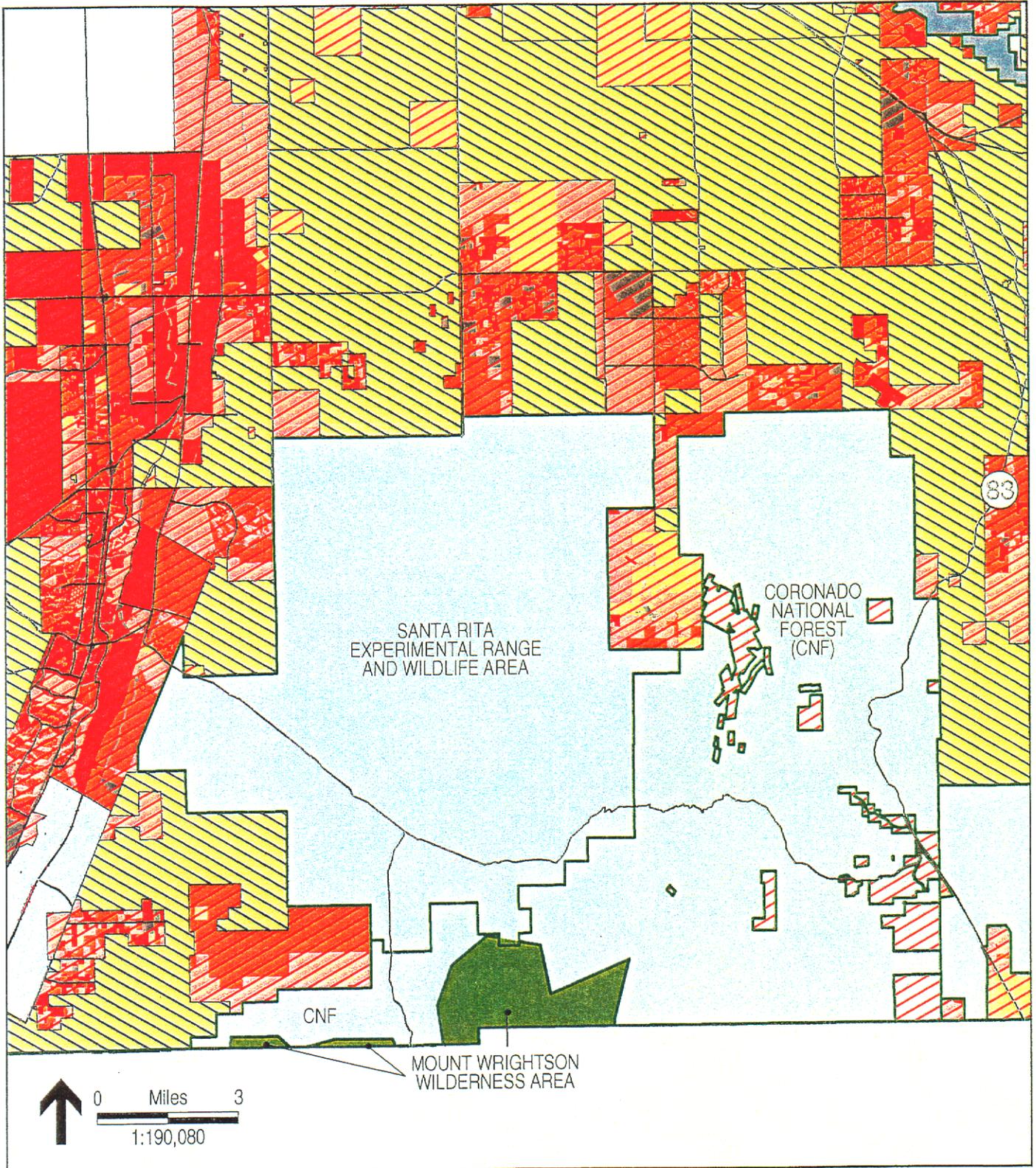
*(See Figure 1 for summary of conservation status definitions)

**APPENDIX D
MANAGEMENT ISSUES WITHIN EXISTING RESERVE AREAS**

Reserve Management Areas & Reserves	Conservation Status	Management Concerns & Issues of the Reserve Management Area	Potential Management Responses or Opportunities
Las Cienegas Reserve Management Area			
Las Cienegas National Conservation Area (now includes the Empire-Cienega Resource Conservation Area)	2. The newly created NCA is permanently protected but does not yet have a management plan. An interim plan will be developed. Meanwhile the BLM's Phoenix Resource Management Plan stays in effect. The GAP status may change once the new plan is developed. New mining and oil drilling will be banned; grazing, hunting, and other recreational uses will still be allowed. (3b. Mining and other potentially detrimental existing uses still permitted?)	<ul style="list-style-type: none"> • Lot splitting and unregulated subdivision of land. • Increase in groundwater pumping and no current potential for CAP infrastructure extending to serve this area. • Groundwater rights at Empirita Ranch, if tapped, could impact downstream perennial flows through Cienega Creek. • Surface flows of Cienega Creek are diverted at the west end of the Preserve. • Potential for development in areas of limestone soils in the vicinity of Colossal Cave Park; • Impacts to needlespine pineapple cactus and agaves that support the endangered LLN Bat and other bats. • Extent of State Lands in biologically sensitive areas that could be released for development. • Existing zoning plan for Vail-Posta Quemada reflects medium and high density as well as industrial uses along Cienega Creek. Much of this is State Land which is subject to sale and development. • New subdivisions and land development along I-10 and further south are indicative of the development pressure in this area. • The I-10 overpass at Davidson Canyon 	<ul style="list-style-type: none"> • Develop the Las Cienegas NCA Management Plan in the context of management and species goals of the SDCP. • Continue monitoring and evaluating watershed and rangeland health. • Carefully allow recreational uses that do not degrade wetland and riparian ecosystems. • Develop and implement a visitor education program to encourage responsible use of public lands, including leased ranch lands. • Conduct stock tanks surveys to identify management needs or modifications required to maintain or establish habitat for native fish and frogs. • Support efforts to design and implement a native frog conservation and reestablishment (in cooperation with BLM, AG&F and area ranchers.) • Work with private land developers to assist in combating the establishment and spread of invasive exotic species, particularly bullfrogs in man-made ponds (e.g., golf course ponds).
Cienega Creek Natural Preserve	1a. A +-1,500-acre portion of Cienega Creek NP is managed under Conditions, Covenants, and Restrictions which provide permanent protection for certain resources and restrictions for activities.		

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Las Cienegas, cont.		<p>currently allows wildlife movement. That should be retained.</p> <ul style="list-style-type: none"> Aggregate mining along the Pantano wash has changed the hydrology and will continue to cause upstream channel cutting and erosion. The extraction of mineral resources in Davidson Canyon could be detrimental to biological resources both up and downstream. Grassland wildfires are a concern; controlled burns can be used as an effective range management tool. 	<ul style="list-style-type: none"> Design and implement a plan to protect the Empire-Cienega Ranch area from invasive exotic species, especially fishes, by getting the exotics out of the surrounding drainage basin. Work with AG&F and the legislature to reach goal of prohibiting bullfrogs. Protect the Cienega Creek watershed from the establishment of invasive exotic species, especially fishes. Support & encourage ranchland stewardship programs such as deferred grazing. Consider land use and transportation policies that would place strong emphasis on protecting riparian areas, the areas of limestone soils near Colossal Cave, and the crossing of Davidson Canyon. Evaluate the costs of purchasing groundwater rights at Empirita Ranch. Evaluate the benefits and consequences of rescinding the Vail-Posta Quemada zoning plan. Participate in the dialogue and federal study of the Sonoita Valley Conservation Acquisition District, particularly as it addresses the conservation of State Lands and their addition to the NCA.
Cienega Creek Natural Preserve	3a. Most of the reserve does not have permanent protection.		
Colossal Cave Mountain Park	3a. Not subject to permanent protection or a management plan.		
Pima County's Empirita Ranch	3b. Not subject to permanent protection or grazing management. A total of 1,600 feet of groundwater pumping per year by others is permitted, though not yet used.		
BLM Lands			
State Lands			
Private Lands			
Ranch Lands			



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Santa Rita Mountains Reserve Management Area

- Reserve Management Area Components**
- Existing Reserve Areas
 - BLM Lands
 - State Lands
 - Private Lands
 - Major Road or Highway

- Level of Threat**
- Low
- ↓
- High

- Conservation Status***
- Most Protected
- 1a
 - 1b
 - 2
 - 3a
 - 3b
- ↓
- Least Protected

- 4a
- 4b
- 4c
- 4e
- 4f
- 4x

Figure 10

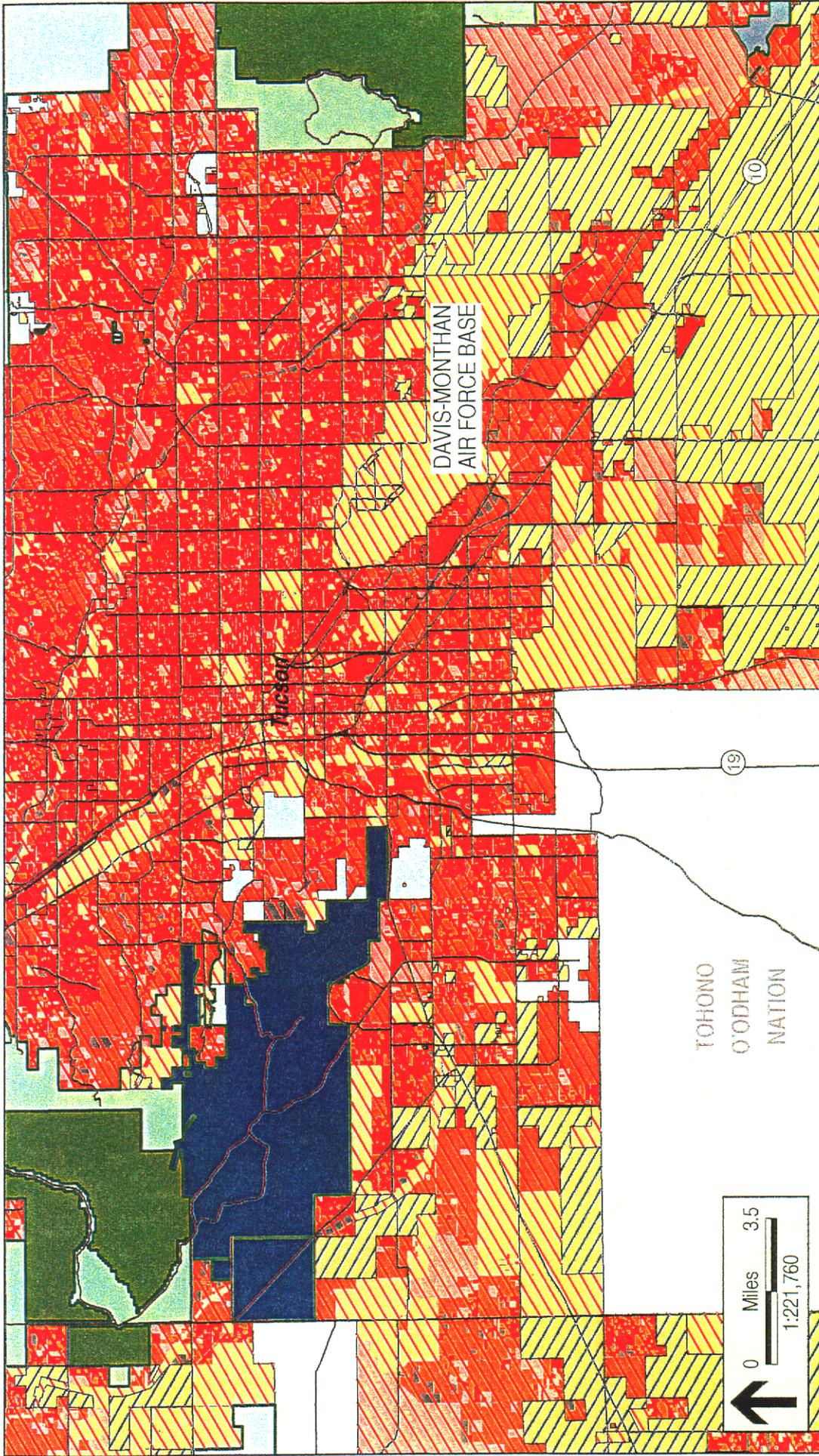
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**APPENDIX D
MANAGEMENT ISSUES WITHIN EXISTING RESERVE AREAS**

Reserve Management Areas & Reserves	Conservation Status	Management Concerns & Issues of the Reserve Management Area	Potential Management Responses or Opportunities
Santa Rita Mountains Reserve Management Area			
Mt. Wrightson Wilderness Area	1a. Wilderness areas are managed under the mandates provided in the Wilderness Act of 1964. The wilderness designation gives permanent, legal protection to land resources.	<ul style="list-style-type: none"> Increased urbanization along the north and west sides of the Santa Ritas, much of which is unregulated in areas of erosive dissected watercourses. Continued residential growth in Sahuarita and Green Valley adjacent to the Santa Cruz River is altering the biological resource potential of the watercourse, particularly at confluences requiring channelization. 	<ul style="list-style-type: none"> Consider land use policies and acquisitions along Davidson Canyon to preserve a critical link between the Santa Ritas and the Cienega Creek. Same for area between Madera Canyon Creek/Wash and Canoa Ranch property. Numerous biological restoration opportunities at Canoa Ranch (riparian, wetland, mesquite bosques, upland areas, agricultural fields). Work with private land developers to assist in combating the establishment and spread of invasive exotic species, particularly bullfrogs in man-made ponds (e.g., golf course ponds). Develop a range of cooperative agreements to facilitate continued ranching as a viable land use. Work with NRCO on watershed improvement projects. Survey the various ongoing research projects at SRER and on USFS lands. Work cooperatively to track mineral extraction interest and ongoing activities. Research opportunities to add BLM "disposable" lands to the reserve system
Coronado National Forest (Unreserved)	3b. Subject to a management plan. Allows logging, mining, other uses potentially detrimental to preserve natural resources.	<ul style="list-style-type: none"> Large tracts of State Land being considered for reclassification for commercial uses, and "disposal" (i.e., sale and subsequent development). 	
Santa Rita Experimental Range	3b. The range is used for ecological and rangeland research. Its purpose is to explore ways to manage range lands for a variety of uses, and may involve the introduction of exotic species, brush control, and other uses that do not necessarily promote maintaining biodiversity. Numerous research and	<ul style="list-style-type: none"> High potential for conversion of ranches to higher intensity uses with resulting decrease in ability to manage open space on a landscape scale. Increased groundwater pumping to support residential growth, mining, and golf courses. Extension of CAP line to serve the area is being considered. Concern for long-term viability of SRER now that it has been transferred to ASLD. Increased vehicular access across the SRER with associated problems of habitat degradation, roadkill, and introduction and 	

**APPENDIX D
MANAGEMENT ISSUES WITHIN EXISTING RESERVE AREAS**

Reserve Management Areas & Reserves	Conservation Status	Management Concerns & Issues of the Reserve Management Area	Potential Management Responses or Opportunities
<p>Santa Ritas, cont.</p> <p>BLM Lands</p> <p>State Lands</p> <p>Private Lands</p> <p>Ranch Lands</p>	<p>monitoring projects are ongoing.</p>	<p>spread of invasive species.</p> <ul style="list-style-type: none"> • Increased recreation use throughout, particularly along the east flank of the Santa Ritas. Unauthorized ORV damage, and increased risk to cave habitats. • Inadequate supervision and monitoring of visitor use. • Mineral resources in the Santa Ritas, if fully tapped, would result in habitat loss, potential downstream negative impacts, and increased groundwater pumping. 	<p>(e.g., block near Helvetia).</p> <ul style="list-style-type: none"> • Increased efforts to educate visitors and monitor use. USFS in process of protecting some of the higher use areas and has a permit program for cave access in Gardner Canyon.



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Tucson Basin Reserve Management Area



Figure 11

APPENDIX D
MANAGEMENT ISSUES WITHIN EXISTING RESERVE AREAS

Reserve Management Areas & Reserves	Conservation Status	Management Concerns & Issues of the Reserve Management Area	Potential Management Responses or Opportunities
Tucson Basin Reserve Management Area			
Davis-Monahan Air Force Base		<ul style="list-style-type: none"> • Urbanization has resulted in extensive habitat loss, alteration, fragmentation, and degradation. • Dependence on groundwater has resulted in declining groundwater levels and stream surface flows, directly affecting riparian and wetland species' habitats. • Watercourses have been altered and channelized to accommodate storm water drainage requirements of the urban area. • Watercourse channels have been utilized extensively for aggregate mining and waste disposal. 	<ul style="list-style-type: none"> • Coordinate the Comprehensive Plan Update with the SDCP Reserve Design to prioritize and protect habitats of Priority Vulnerable Species. • Reevaluate County policies on aggregate mining and other land uses allowed within watercourse floodplains. • Reevaluate County policies on Riparian and Native Plant Protection.
Parks and Open Space Private lands with permanently protected open space.		<ul style="list-style-type: none"> • Unregulated growth and supporting roads and utilities in the urban fringe has further fragmented the landscape and placed increasing demands on groundwater pumping from individual wells. • CAP use has been approved for use in meeting potable water needs. This takes some pressure off groundwater pumping. • CAP use for direct discharge opens the possibility of contaminating the watershed with CAP waterborne viruses, bacteria, and non-native aquatic species. • Agreements between the City and County will allow the County to utilize greater amounts of 	<ul style="list-style-type: none"> • Research, design and implement a program to address non-native, invasive and exotic species, focusing on those that affect Priority Vulnerable Species. • Research and design a basinwide riparian wetland restoration program specific to the Tucson area to provide habitat for native fish and frogs and combat introduced and invasive species. Develop a long-term implementation program. • Work in concert with the City, U.S. Army Corps, USFWS and AG&F to develop riparian restoration projects. Balance recreation related needs with restoration goals. • Work with Tucson Water to evaluate

**APPENDIX D
MANAGEMENT ISSUES WITHIN EXISTING RESERVE AREAS**

Reserve Management Areas & Reserves	Conservation Status	Management Concerns & Issues of the Reserve Management Area	Potential Management Responses or Opportunities
Tucson Basin, cont.		<p>effluent for riparian restoration and recharge. By making effluent more affordable it will be more cost effective to replace groundwater use with effluent use at golf courses and large turf areas.</p> <ul style="list-style-type: none"> Private lands adjacent to existing reserves are under increasing development pressure. 	<p>their priorities for well closures, particularly important in areas of shallow groundwater and remaining riparian woodlands (e.g., Tanque Verde Creek and Sabino Creek areas).</p> <ul style="list-style-type: none"> Options to utilize CAP water must address USFWS concerns regarding its potential for jeopardizing endangered fish and frog species. Continue to pursue opportunities for land acquisitions and expansions to existing reserve boundaries, particularly areas that would protect riparian habitats and areas of high suitability for Priority Vulnerable Species. Design and implement a multifaceted, cross-jurisdictional public education program to address significance of riparian protection/restoration, native aquatic species, non-native invasive species, and use/protection of public lands. Identify needs for surveying and monitoring County reserve lands for Priority Vulnerable Species. Develop Management Plans for each of the County reserve land areas