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EXECUTIVE SUMMARY

The continued growth of the human-built environment in Pima County, Arizona will result in the "incidental take" of species that are listed under the Endangered Species Act (ESA). To avoid, minimize, and mitigate impacts to both listed and unlisted species and their habitats, Pima County has developed this Multi-species Conservation Plan (MSCP) for 44 species (4 plants, 7 mammals, 8 birds, 5 fishes, 2 amphibians, 6 reptiles, and 12 invertebrates) that may be impacted as a result of the otherwise lawful activities of Pima County and its development community. The Incidental Take Permit, also called a Section 10 (a)(1)(B) permit, will not exceed 30 years. This MSCP is part of the required documentation needed to receive an Incidental Take Permit from the U.S. Fish and Wildlife Service (USFWS) under Section 10(a)(1)(B) of the ESA.

The primary Covered Activities under the permit are maintenance and construction activities carried out by Pima County and the Pima County Regional Flood Control District (collectively referred to herein as 'Pima County' or 'the County') and certain development activities of the private sector that occur within the Permit Area, which is a subset of the area within the geographic boundaries of Pima County. Private development activities included as Covered Activities are limited to ground disturbances subsequent to the County's issuance of a building permit that authorizes grading of 14,000 square feet or more on individual, single dwelling lots and ground disturbances subsequent to the County's issuance of a site construction permit for the development of residential subdivisions and non-residential facilities. Permit coverage will be provided to single dwelling residential lots at the time Pima County issues a building permit to authorize grading of 14,000 square feet or more, unless the property owner declines coverage. Impacts related to private-sector development of residential subdivisions and non-residential facilities will be covered under the County's Section 10 (a)(1)(B) permit only when the property owner elects to participate, provided that the property owner has applied for a site construction permit and that certain other criteria are met.

Based on the suite of Covered Activities and a modeling of urban growth projections, Pima County anticipates that there will be approximately 36,000 acres of disturbance resulting from the Covered Activities within the Permit Area during the 30-year permit period. For this amount of disturbance, Pima County would provide approximately 116,000 acres of mitigation. Despite not yet having a Section 10 (a)(1)(B) permit, Pima County has acquired over 74,000 acres of fee-owned lands and over 124,000 acres of lease lands that provide the portfolio of lands Pima County would use to fulfill the Section 10 (a)(1)(B) permit mitigation obligations. Partial mitigation credit will be granted for lease lands and for improving natural resource conditions on those lease lands. Other important avoidance, minimization, and mitigation measures related to this MSCP rely upon the County's continued application of various County Code requirements and departmental procedures that mandate the avoidance and mitigation of impacts to on-site sensitive resources.

Land management is a critical component of this MSCP. Current and on-going efforts focus on protecting and perpetuating the continued health of those natural resources for which the land was secured. Current management practices emphasize the restoration of selected conservation targets (e.g., riparian areas) and minimize on-site threats such as invasive species and illegal trash dumping. Because the portfolio of lands Pima County intends to use for Section 10 (a)(1)(B) permit mitigation includes active grazing lands, ranch management is also forefront in the County's land management responsibilities. Under the Section 10 (a)(1)(B) permit, Pima County would continue to collect ranch–related monitoring data and trend information and initiate a broader-scale ecological monitoring program for a suite of program elements designed around individual species, species' habitat, threats, and climate. Adaptive management will be employed in select settings, for example in the ranchland element and in riparian restoration. The monitoring and adaptive management programs will be reviewed with and by the USFWS to ensure they are providing timely and relevant information.

This MSCP highlights a set of circumstances that may change after the USFWS issues a Section 10 (a)(1)(B) permit and for which Pima County will make efforts to address. These changed circumstances range from increased groundwater withdrawal impacts on riparian resources to increased off-road vehicle (ORV) traffic. Unforeseen circumstances are those that the County cannot reasonably anticipate and, therefore, will not be held responsible for addressing through management actions beyond those outlined in the MSCP, including no additional requirements for financial or land resources.

Pima County has spent approximately $150 million on land acquisitions since 2004 in preparation for the Section 10 (a)(1)(B) permit mitigation needs. These dollars came primarily from bond funds approved by voters in 2004. Most of the management and enforcement functions associated with this MSCP are already taking place as the County implements the natural resource and open-space elements of the Sonoran Desert Conservation Plan. Implementation of the more comprehensive ecological monitoring program, which is required subsequent to the issuance of the Section 10 (a)(1)(B) permit, will result in new programmatic costs for the County.

Pima County has, to date, diligently enacted a transparent process in the development of the MSCP and has provided abundant opportunities for public participation and expert oversight. Pima County intends to carry this philosophy forward into the implementation stages of the MSCP and will make annual and decennial reporting on take, habitat loss, and mitigation activities available to the public.

The suite of conservation measures proposed in this MSCP provide a higher level of protection for Covered Species and their habitats than would otherwise take place without Pima County's receipt of a Section 10 (a)(1)(B) permit. The County's receipt of a Section 10 permit would also increase regulatory certainty and streamline ESA compliance for the County as well as other members of the community, especially the development sector.

1 INTRODUCTION TO THE PIMA COUNTY MULTI-SPECIES CONSERVATION PLAN

Following the 1997 listing of the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) as a federally endangered species, the Pima County Board of Supervisors initiated the Sonoran Desert Conservation Plan (SDCP). The purpose of the SDCP was to develop a regional plan to address the long-term conservation and preservation of the County's natural and cultural resources (Pima County 2000a). The development of the SDCP was an iterative process whereby planning tools were developed using science-based principles, shaped by public input and review, and ultimately refined into proposals that reflected the community's values. Many SDCP initiatives are currently being implemented.

This MSCP represents the culmination of many years of planning and studies in the development of the biological element of the SDCP. That work effort was guided by the SDCP biological goal, as established by the Science Technical Advisory Team (STAT):

> *To ensure the long-term survival of the full spectrum of plants and animals that are indigenous to Pima County through maintaining or improving the habitat conditions and ecosystem functions necessary for their survival.*

In 2001, the Pima County Board of Supervisors adopted the Pima County Comprehensive Land Use Plan Update (Pima County 2001a), which incorporated land-use concepts, policies, and principles of conservation that were identified in the draft Preliminary SDCP (Pima County 2000a). Other milestones in the development of the SDCP include defining land-protection priorities, securing funds for land acquisitions, acquiring and managing new preserves, and revising and updating County regulations. Formalizing the County's conservation commitments for compliance with the ESA is the next milestone in advancing the vision of the SDCP.

1.1 Purpose and Need for the MSCP

As mentioned, the Pima County MSCP is a keystone facet of the SDCP that would provide Pima County with incidental take protection under the ESA for Covered Species and Covered Activities, as identified herein. Specifically, Section 9 of the ESA prohibits the "take" of threatened and endangered species including "the attempt or action to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" such species. However, Section 10(a)(1)(B) (herein Section 10 permit unless otherwise noted) of the ESA authorizes exceptions for take that may occur incidentally to otherwise lawful activities through the issuance of a permit that requires development and implementation of a habitat conservation plan. A habitat conservation plan must thoroughly describe the effects of the covered activities and any anticipated take on affected species and the conservation measures that will avoid, minimize, and mitigate these impacts.

For the purpose of the County's Section 10 permit, the County's conservation plan and associated plan requirements are to:

- Permit non-Federal projects to take federally listed species while not jeopardizing their long-term survival in the wild;
- Promote the long-term conservation of Covered Species and their habitats;
- Reduce conflicts between Covered Species and economic activities;
- Develop partnerships both within the public sector and between the public and private sectors. Examples of partnerships include monitoring and property management;
- Provide regulatory streamlining for county operations and the private sector; and
- Provide opportunities for the conservation of State Trust lands.

The County's proposed conservation plan addresses the needs of multiple species and their habitats, hence the multi-species designation (i.e., MSCP). As part of the MSCP and SDCP planning efforts, Pima County and its cooperators developed a host of planning documents that together provide a thorough analysis of Pima County's natural resources, conditions, and warranted conservation measures. This MSCP document is not intended as a summary of these studies (see Section 2.2 for summary information), but rather it:

- Serves as the document of record for anticipated incidental take, habitat loss, mitigation, management, and monitoring of Covered Species and their habitats as a result of Covered Activities;
- Establishes a phased approach to implementing the Pima County MSCP with appropriate interim milestones for meeting requirements associated with projected impacts;
- Provides a means for tracking mitigation obligations and credit; and
- Provides a programmatic framework for developing other Section 10 permits for non-Pima County jurisdictions and potentially facilitating Section 7(a)(1) consultations for Federal agencies, including the U. S. Army Corps of Engineers (Corps), U. S. Bureau of Land Management (BLM), and others.

1.2 MSCP Goals and Objectives

The overall goal of the Pima County MSCP is to balance the need to comply with the ESA while allowing for the future growth of the built environment. The biological goal of the Pima County MSCP is to provide a long-term conservation benefit to Covered Species, their habitats, and ecosystem processes within the planning area while

preserving the ability of Pima County and its development community to engage in otherwise lawful development-related activities.

The biological objectives for the MSCP are to:

- Avoid and minimize take where and when possible by siting Covered Activities such that they promote the integrity of the Maeveen Marie Behan Conservation Lands System (CLS) and are situated so that sensitive on-site resources are avoided or conserved;
- Mitigate loss of approximately 36,000 acres of Covered Species' habitat in a manner consistent with the County's CLS reserve design;
- Manage mitigation lands to prioritize the conservation of Covered Species and their habitats, within the constraints allowed by law;
- Enhance habitat for Covered Species, prevent landscape fragmentation, and support species establishment or recovery; and
- Detect potentially harmful and ecologically significant changes early enough to implement management practices that reverse or prevent long-term degradation of Covered Species and their habitats.

1.3 Pima County MSCP: Required Elements

As stipulated in Section 10(a)(2)(A) of the ESA, Pima County must address the following required elements in this MSCP:

- The impact(s) that will likely result from the covered activities and anticipated incidental taking (see Chapter 3);
- Those steps Pima County will take to avoid, minimize and mitigate such impacts (see Chapter 4);
- The funding that will be available to implement such steps (see Chapter 8);
- Alternative actions to the anticipated incidental taking that were considered (see next section); and
- Other measures that may be required or appropriate for the purposes of the plan.

In the updated addendum to the Habitat Conservation Plan (HCP) Handbook (U.S. Fish and Wildlife Service 2000), a "5-point policy" further articulates components of the Habitat Conservation Planning program that must also be addressed, namely: biological goals, adaptive management, monitoring, permit duration, and public participation. These elements are addressed throughout this MSCP.

1.4 Take

1.4.1 Definition of Incidental Take

The ESA defines take as harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting any threatened or endangered species. Incidental take, by contrast, is take related to otherwise legal activities that are covered under a Section 10(a)(1)(A) permit. Most of the Covered Activities under Pima County's Section 10 permit will result in modification of habitat of listed species, which can result in take. Throughout this document, there is a focus on the location and extent of habitat loss that might lead to take; in some cases loss of habitat is used as surrogate for take.

1.4.2 Alternatives to Incidental Take

Pima County has considered alternatives to the incidental taking of ESA listed species that would result from Covered Activities as proposed herein. These alternatives address Federal actions where the project proponent would secure an individual Section 10 permit or where the Federal action agency would complete a Section 7 consultation under the ESA; both coming at the sole expense of the project proponent. Section 7 consultations only cover species that are federally listed at the time of the consultation. In addition to establishing a single entity with the responsibility to provide mitigation for otherwise disparate projects, the MSCP alternative affords mitigation and conservation that generates landscape-level ecosystem benefits, which would not occur without a regional Section 10 permit, such as Pima County is pursuing.

Alternative 1: Status Quo. Under this alternative, each public-sector and private-sector project with the potential for take of listed animals must comply with the ESA by either 1) undergoing a Section 7 consultation process with the USFWS if there is a Federal nexus to the project, or 2) obtaining an individual Section 10 permit from the USFWS for non-Federal actions not covered under Section 7. Though avoidance, minimization, and mitigation measures may be an outcome of Section 7 or individual Section 10 permits, the cumulative effects of adverse impacts on—or take of—listed species may be greater than under the MSCP approach because of the piecemeal approach to conservation and mitigation of a project-by-project approach rather than a regional or landscape approach, as proposed by Pima County's MSCP. Furthermore, under Alternative 1 there is no consideration of non-listed species unless they are migratory birds or bald or golden eagles covered under existing Federal regulations. Alternative 1 has the potential to create uneven levels of conservation for the listed species because the USFWS must review and coordinate implementation of numerous individual, un-related agreements. This alternative also lacks continuity of minimization, management and monitoring activities, which leads to inefficiencies and, potentially, additional take of listed species.

Alternative 2: No Take of Listed Species. Under this alternative, all development activities would stop when and where there is potential for incidental take of listed species, until such time as the species is de-listed or moves on, or the intended land use is changed such that no take would occur. This option is not possible given the constitutional requirement of Pima County to issue certain permits as delegated by the

State of Arizona, and the importance of the County's continued services for public health, safety, and welfare, which ultimately depend on the economic prosperity of the County. Even if all projects with the potential for take of listed species were halted or re-configured to avoid take, inadvertent take of listed species would still occur due to failures to detect the species or unintended consequences of development upon factors essential for the survival of individual plants and animals. Under this alternative, there would be no conservation or management of habitat for those species where take is avoided by deferring the project to a time when the habitat is unoccupied. Furthermore, there would be no conservation or mitigation for unlisted species or plant species under this alternative. This alternative would provide no protection or incentive for species and habitat enhancements or projects that have the potential to result in benefits to species and their habitats.

2 PLANNING AREA AND BACKGROUND INFORMATION

2.1 Pima County MSCP Planning Area

The Planning Area for the Pima County MSCP is the entire 9,184 square miles (5,879,669 acres) of Pima County. Elevations range from 1,200 feet in the western portion of the County to over 9,000 feet in the Catalina Mountains in the northeastern portion of the County. Geographically, the Planning Area is representative of the Basin and Range Province, with mountainous "sky islands" separated by the desert valleys.

The Tohono O'odham Nation is the single largest land holder in Pima County and, together with the Pascua Yaqui Nation, results in Tribal lands accounting for 42% of Pima County's land ownership (Table 2.1; Figure 2.1). The Federal government and the State of Arizona are the second and third largest land owners in Pima County, respectively. Pima County owns <2% of the land in the County. Incorporated jurisdictions within Pima County include the cities of Tucson and South Tucson, and the towns of Oro Valley, Marana, and Sahuarita.

2.2 Collection and Synthesis of Data for the SDCP and MSCP

Chapter 1 provides an overview to Pima County's initiation of a comprehensive planning process for the SDCP in 1998. Crucial to the part of that effort related to the conservation of biological diversity was the team of natural resource scientists known as the Science Technical Advisory Team (STAT; see Section 11.2 for list of participants) who were selected for their regional expertise. The STAT, Pima County staff, consultants, and other biologists and natural resource managers identified key planning elements and information necessary to design a biological reserve such as: species of greatest conservation concern (see Section 2.2.1); threats and stressors (Pima County 2000b); and mapping and data gathering needs (RECON Environmental Inc. 2000a).

Table 2.1. Land ownership in Pima County.

Owner	Acres	Percent Ownership within Pima County (rounded)
Federal: Bureau of Land Management	375,486	6.4
Federal: Bureau of Reclamation	2,997	<0.1
Federal: Department of Defense	68,251	1.2
Federal: U.S. Fish and Wildlife Service	514,157	8.7
Federal: National Park Service	409,629	7.0
Federal: U.S. Forest Service	336,890	5.7
State of Arizona	863,858	14.7
Tribal	2,476,159	42.1
Pima County	110,868	1.9
Municipal	44,059	0.8
Private	686,911	11.7
Total acres	5,879,669	

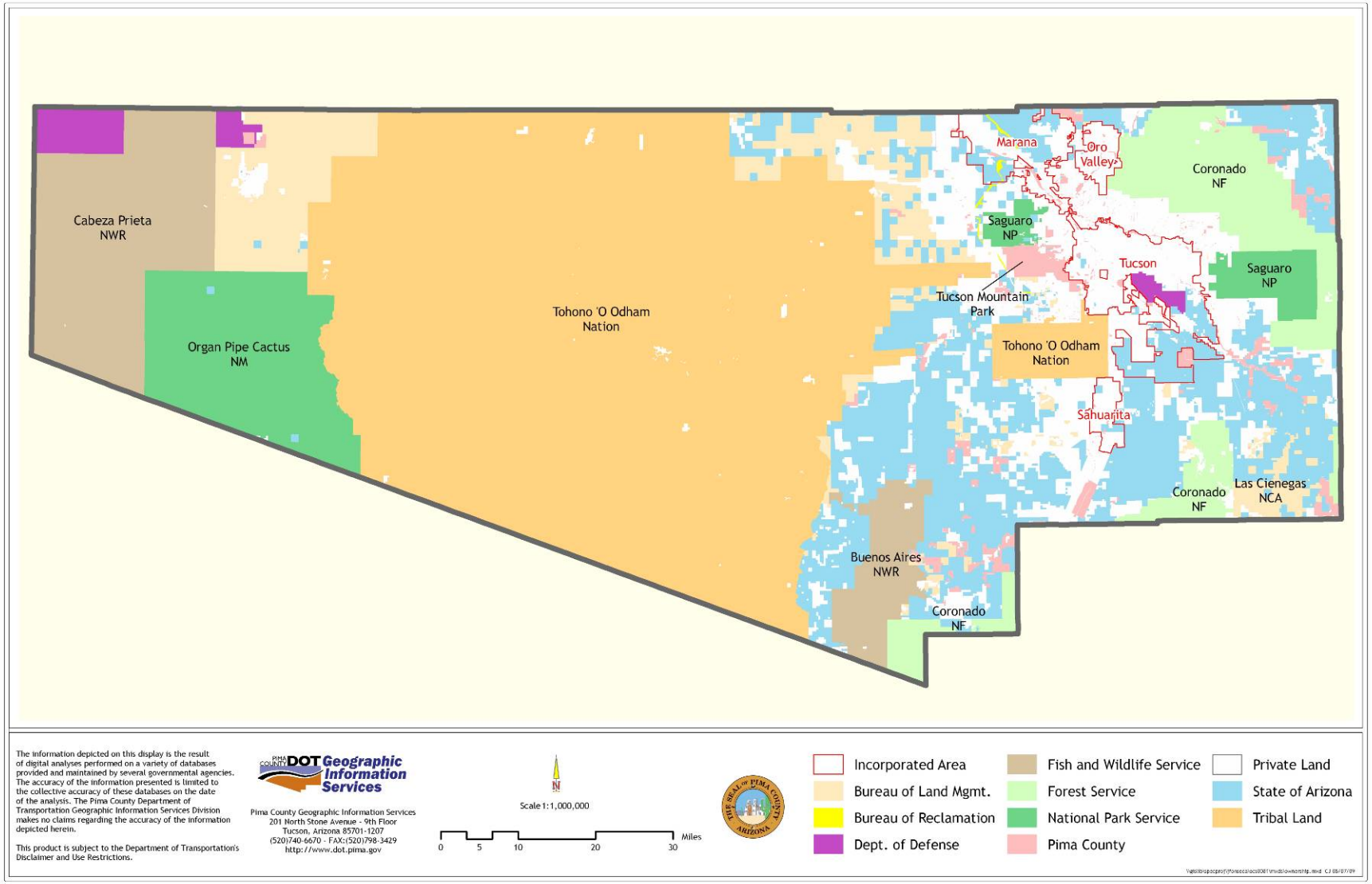

Figure 2.1. Pima County MSCP Planning Area by land owner type and major preserves.

This work led to the design of the CLS, a regional biological reserve system (Pima County 2001a; see Section 2.2.2 below). The results of this process, which are detailed in an extensive series of technical documents (Pima County 2000a, 2000c, 2000d, 2001b, 2001c), form the foundation of the Pima County MSCP.

2.3 Priority Vulnerable Species

The plant and animal information and data that STAT collected in the development of the biological component of the SDCP is foundational to this MSCP. In review, Pima County, under the direction of the STAT, developed a list of the most vulnerable plants and animals within Pima County (RECON Environmental Inc. 2000b). Planners began with a list of over 100 species recognized by the Federal government as imperiled, species extirpated from Pima County, and additional species whose populations are in decline or jeopardy. That list was then refined based on species' occurrence, residency status, and opportunities for conservation in Pima County (Fonseca and Scalero 1999). This refinement resulted in a list of 56 species that became known as the Priority Vulnerable Species (RECON Environmental Inc. 2000a). These species played an instrumental role in the development of the biological component of the SDCP and many of the subsequent planning tools, such as the CLS. For purposes of the MSCP, the list of Priority Vulnerable Species has been further reduced to those species warranting Section 10 permit coverage. These species, known as the Covered Species, are the focus of this MSCP (Appendix A).

2.4 The Maeveen Marie Behan CLS and the Reserve Design Process

For purposes of this MSCP, the CLS is the primary tool by which Pima County will—along with species' Priority Conservation Areas—evaluate habitat loss and determine mitigation necessary to maintain compliance with the terms of the Section 10 permit. Pima County's use of the CLS for the permit will differ from its use to implement the Environmental Element of the County's Comprehensive Plan. Although the CLS map and categories are the same in both applications, Pima County will hold itself to higher mitigation ratios for impacts that occur on lands within the CLS than those mitigation ratios the Board of Supervisors uses when applying the Environmental Element of the Comprehensive Plan to discretionary land-use changes on private property. The remainder of this section provides background information on the development of the CLS.

The scientific foundation for the CLS is information relating to both the natural and built environments in Pima County, especially the identification of areas of high species richness (i.e., total number of species) of Priority Vulnerable Species and unique landscape features known as Special Elements (Fonseca and Connolly 2002). For this process, Pima County and its cooperators used a Geographic Information System to map the distribution of known locations for Priority Vulnerable Species and their potential habitat by modeling important, broad-scale environmental variables (e.g., vegetation, soils, and water features) for each Priority Vulnerable Species (RECON Environmental Inc. 2000a). Areas of high species richness provided the starting point

for drawing the initial reserve system boundaries, which were delineated on the basis of a complex set of rules developed by STAT and guided by principles of reserve design (RECON Environmental Inc. 2001). In addition to modeling species' habitat, Pima County, in consultation with species experts, also identified critical conservation areas for each Covered Species. These areas are known as Priority Conservation Areas (PCAs) and are the primary mechanism for estimating acres of take for individual Covered Species for the MSCP/Environmental Impact Statement (see Section 3.6.1 for more information on the use of the PCAs).

There are seven CLS categories that are largely distinguished by their comparative values in supporting and representing biological diversity. Tribal lands are excluded from the CLS (Figure 2.2, Table 2.2). Details about how the CLS is used to determine Pima County's mitigation commitments for this MSCP are presented in Section 4.3 and Appendix B. Additional information regarding conservation guidelines for each CLS category as applied through the Comprehensive Plan can be found in Appendix C. The seven CLS categories are:

Biological Core Management Areas are primarily distinguished from other lands within the CLS by their potential to support habitat for *five* or more Priority Vulnerable Species. They also overlay large blocks of contiguous habitat and biological reserves.

Multiple Use Management Areas are primarily distinguished from other lands within the CLS by their potential to support habitat for *three* or more Priority Vulnerable Species and they connect large blocks of contiguous habitat and biological reserves. As such they are not as biologically rich as those lands designated as Biological Core Management Areas.

Important Riparian Areas are valued for their higher water availability, vegetation density, and biological productivity. They are also fundamental to preserving landscape connectivity.

Scientific Research Areas are lands currently managed for scientific research include: the Santa Rita Experimental Range and the University of Arizona Desert Laboratory (at Tumamoc Hill).

Table 2.2. Acres of land in each CLS category and non-CLS lands in Pima County, excluding tribal lands.

Relationship to CLS	CLS Category	Total (acres)
Inside CLS	Biological Core Management Area	899,915
	Multiple Use Management Area	950,505
	Important Riparian Area	158,178
	Scientific Research Area[a]	54,000
	Agricultural Inholding	9,691
	Special Species Management Area[a]	997,582
Outside CLS		456,513

[a] Scientific Research Areas and Special Species Management Areas can overlay other CLS categories. See Figure 2.2.

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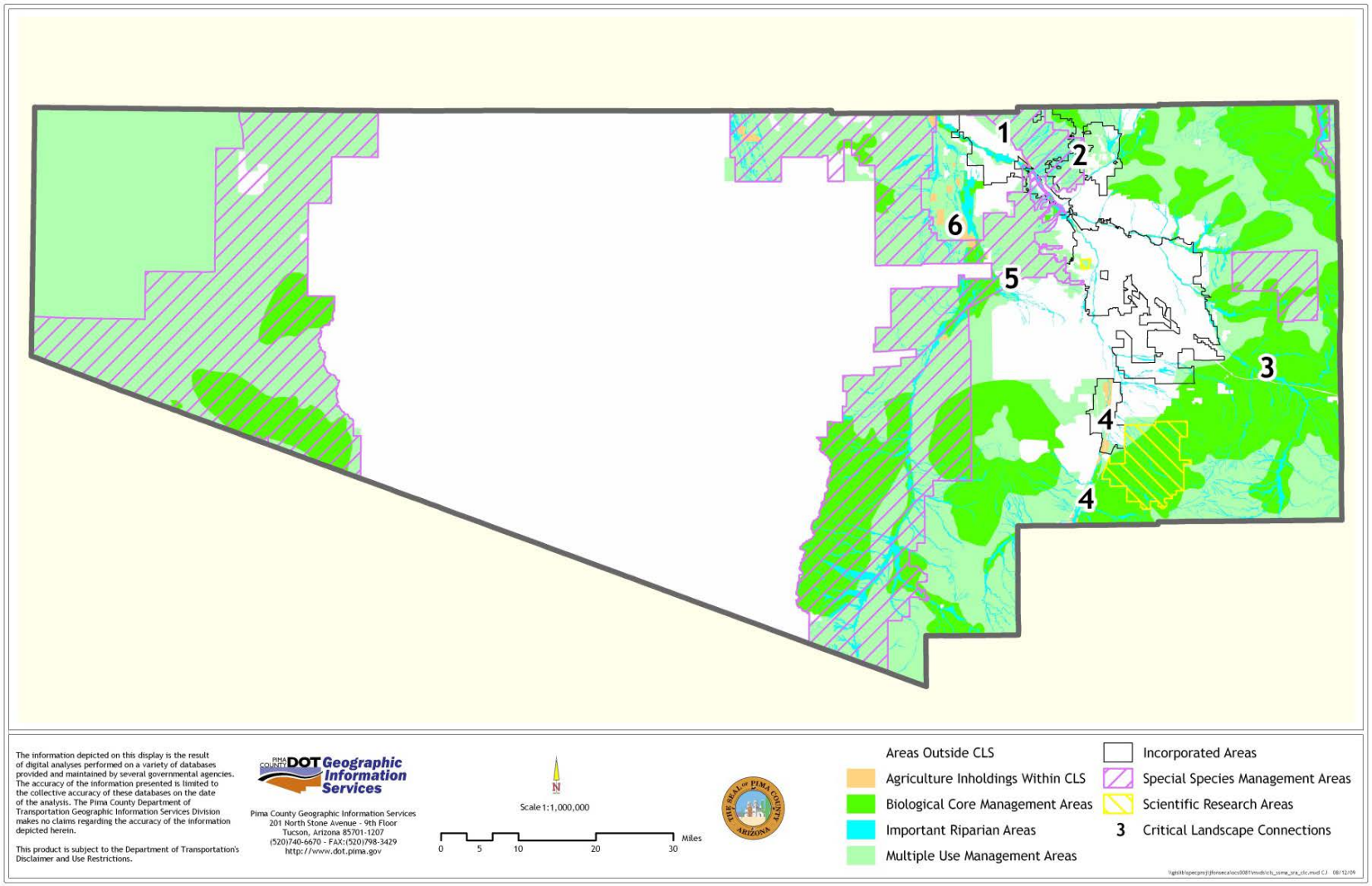

Figure 2.2. Maeveen Marie Behan Conservation Land System (CLS) in Pima County.

Agricultural In-holdings within the CLS are lands utilized for agricultural purposes and lands where agricultural uses have been abandoned. Agricultural land uses, in general, are more conducive to the movement of native fauna and functional pollination processes than other lands supporting higher-intensity human uses.

Special Species Management Areas are defined as crucial for the conservation of three animal species of special concern to Pima County (cactus ferruginous pygmy-owl, southwestern willow flycatcher, and Mexican spotted owl). (The Mexican spotted owl is not a Covered Species, but it was considered in the planning process for the Special Species Management Area.)

Critical Landscape Connections are broadly defined areas that provide connectivity for movement of native biological resources, but which also contain potential or existing barriers that can isolate major conservation areas.

The development of the CLS was rooted in a rigorous scientific process and has since become a central planning element in the County's work in furthering the goals of the SDCP. The CLS will also play a key role in ensuring the success of the MSCP beyond its use as a tool for calculating mitigation credit. First, the CLS encourages a more compact urban form by not requiring of developers that land be set aside in areas that are outside of the CLS, which are generally closer to the urban core. This is intended to ease development pressure in exurban areas and avoid take of species and their habitats. When development does occur in the CLS, the categories provide a framework for helping to ensure that development occurring in areas of high species richness of Covered Species receive both the maximum amount of on-site set asides and off-site mitigation. The full package of on-site set asides, off-site mitigation, and the acknowledgement of critical landscape connections provides for greater permeability of the landscape by Covered Species and the protection of ecosystem processes that are critical to the long-term survival of Covered Species within the Permit Area. In summary, the CLS seeks to:

- Retain the diverse representation of physical and environmental conditions;
- Conserve the greatest number of species and their habitats;
- Preserve an intact and functional ecosystem;
- Maximize the extent of roadless areas;
- Minimize the expansion of exotic or invasive species; and
- Retain the connectivity of reserve areas with functional corridors.

2.4.1 Public Participation in the SDCP and MSCP

Pima County has made participation by government agencies, organizations, and interested citizens a top priority in the SDCP and MSCP planning processes (see Chapter 11). Participation has included public scoping meetings and comment periods, an 80-member citizens' Steering Committee (see Section 11.2.6 for Steering Committee membership), over 400 public meetings, a series of educational sessions and workshops, meetings of 12 advisory and technical teams, and numerous informal meetings with a variety of interest groups and concerned citizens. Contributions of

information and review from more than 150 scientists, as well as locally and nationally recognized experts in conservation biology, were also incorporated into the MSCP and SDCP.

Local and tribal jurisdictions and State and Federal agencies participated in meetings, on committees, and as members of the Government Working Group. Their concerns and input were included in the reserve design and conservation planning processes. Entities with which Pima County has formal working agreements and/or cooperative agreements are discussed throughout this document.

Eight previous drafts of the MSCP have been made available to stakeholders for review and comment over a ten-year period. This document supersedes all previous drafts.

3 PLAN SCOPE AND ANTICIPATED IMPACTS

3.1 Permit Area

The area in which Pima County is seeking a Section 10 permit (herein "the permit" unless otherwise noted), is known as the Permit Area and includes those lands under the legal authority of the Pima County Board of Supervisors or the Pima County Regional Flood Control District Board of Directors (collectively referred to herein as "Pima County" or the "County" unless otherwise noted). The Permit Area is shown in Figure 3.1 and includes all:

- Private lands within unincorporated Pima County under the legal authority of Pima County, including those State Trust lands that are sold by the state to the private sector and which subsequently come under the legal authority of Pima County; and

- Lands the County owns in fee simple and lands on which the County possesses a property right, including those located within other jurisdictions such as the cities and towns of Tucson, Marana, Oro Valley, and Sahuarita, and adjacent counties; and

- Lands on which Pima County constructs and maintains infrastructure, including lands within the incorporated areas of Tucson, Marana, Oro Valley, South Tucson or in adjacent counties (Santa Cruz, Cochise, and Pinal). See Section 3.4.1.2 for clarifications to Pima County activities in adjacent counties.

The Permit Area also includes State Trust lands:

- Leased to Pima County or used as road or drainage-way easements and
- Where Pima County may acquire the land in fee simple.

The Permit Area also includes certain lands that:

- Pima County might patent from the BLM for open-space purposes either through the Recreation and Public Purposes Act (RPPA) or through future land exchanges or

- Are expected to be released by the BLM to the private sector for development and which would subsequently come under the regulatory authority of Pima County.

The following are explicitly excluded from the Permit Area:

- All other Federal lands not identified above;
- Federally reserved tribal lands;

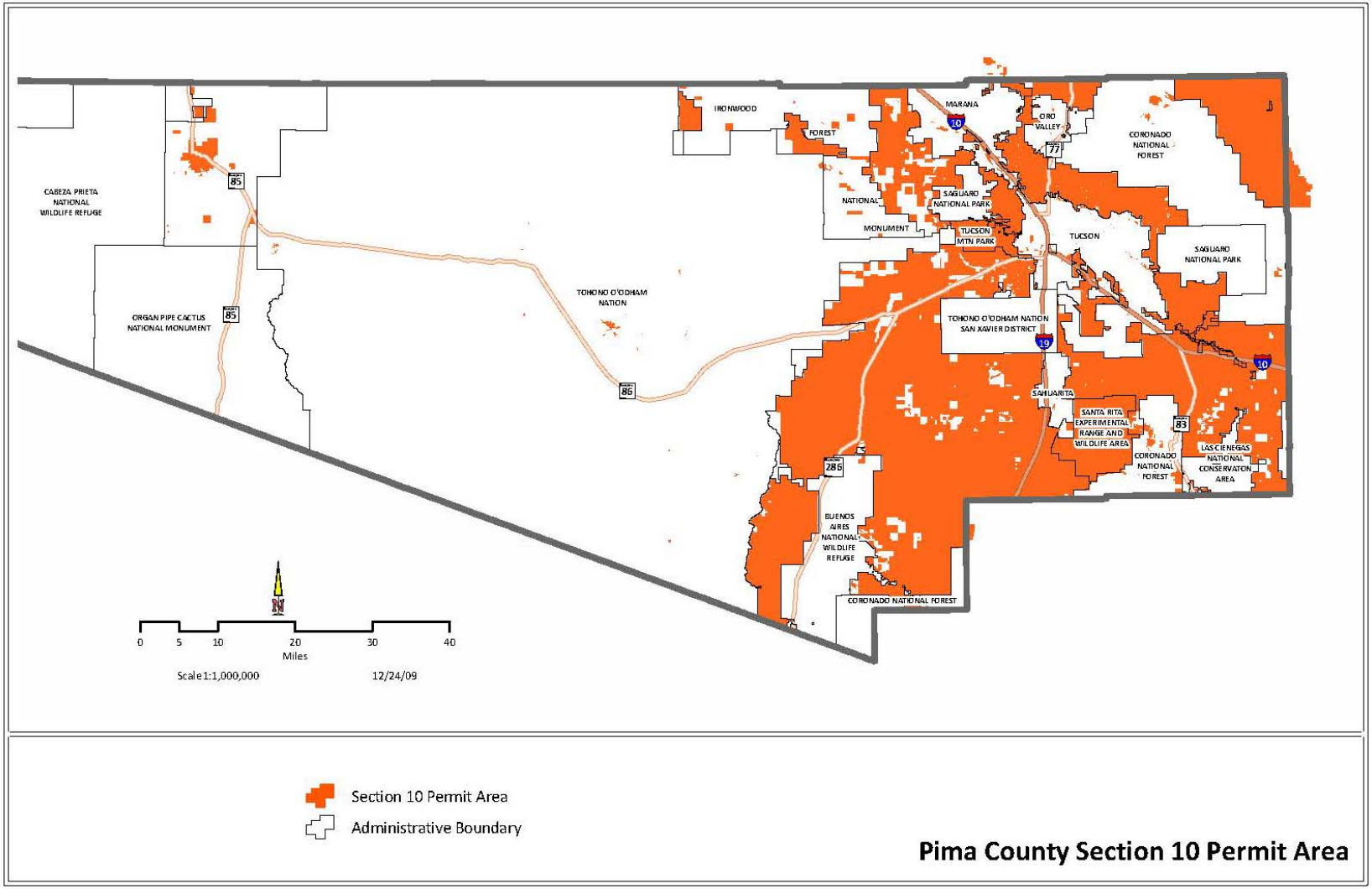

Figure 3.1. Permit Area of the Pima County MSCP, representing the area within which Covered Activities under the Section 10 permit could occur.

NOTE: This map is an approximation of the Permit Area; see text for Permit Area description.

- Lands within incorporated areas, except where Pima County possesses a property right or constructs or maintains infrastructure;
- Lands in unincorporated Pima County that are owned by incorporated jurisdictions;
- Lands annexed into incorporated areas and which are not subject to County building or site construction permit requirements, excluding those lands owned by Pima County;
- County-maintained roadways within Federal or Tribal lands; and
- State Trust lands within Federal reserves.

The Permit Area is expected to change as: 1) cities and towns annex unincorporated lands, 2) Pima County acquires or disposes of land, 3) Federal land is disposed of or exchanged, or 4) tribal lands are federally reserved. Some of these changes may require an amendment to the Permit (see Section 4.11 and the Implementing Agreement; [Appendix D] for permit amendment conditions and procedures).

3.2 Permit Duration

Pima County's Section 10 permit would be for up to 30 years, a period of time that is adequate for the County and the development community's activities and for the County's mitigation strategy. If needed, Pima County can request an extension of the permit for additional acreage within the 30-year term, by way of a permit amendment. Pima County could also request additional time—after the 30-year term is over—by way of a permit renewal.

3.3 Covered Species

Pima County's permit covers 44 species: 4 plants, 7 mammals, 8 birds, 5 fishes, 2 amphibians, and 6 reptiles, and 12 invertebrates (mollusks; Table 3.1). Nine species are currently listed as threatened or endangered under the ESA and an additional species has been petitioned for listing under the ESA. The remaining species are included in the County's MSCP based on their potential to be listed within the permit period and their distribution relative to Covered Activities. Detailed information on the Covered Species can be found in Appendix A; additional information can be found in Pima County (2001b).

3.4 Covered Activities for the Pima County MSCP

Activities to be covered by the incidental take provisions of the Section 10 permit must be:

- Within the Permit Area;
- Likely to result in incidental take;
- Reasonably certain to occur over the life of the permit; and
- Subject to the authority of Pima County.

Table 3.1. Species to be covered under Pima County's Section 10 permit.

Taxon	Common name	Scientific name	ESA Status[a]	Designated (D) or Proposed (PR) Critical Habitat
Plants	Pima pineapple cactus	Coryphantha scheeri var. robustispina	E	
	Needle-spined pineapple cactus	Echinomastus erectocentrus var. erectocentrus		
	Huachuca water umbel	Lilaeopsis schaffneriana ssp. recurva	E	D
	Tumamoc globeberry	Tumamoca macdougalii		
Mammals	Mexican long-tongued bat	Choeronycteris mexicana		
	Western red bat	Lasiurus blossevillii		
	Western yellow bat	Lasiurus *xanthinus*		
	Lesser long-nosed bat	Leptonycteris curasoae yerbabuenae	E	
	California leaf-nosed bat	Macrotus californicus		
	Pale Townsend's big-eared bat	Corynorhinus townsendii pallescens		
	Merriam's mouse	Peromyscus merriami		
Birds	Western burrowing owl	Athene cunicularia hypugaea		
	Cactus ferruginous pygmy-owl	Glaucidium brasilianum cactorum	P	
	Rufous-winged sparrow	Aimophila carpalis		
	Swainson's hawk	Buteo swainsoni		
	Yellow-billed cuckoo	Coccyzus americanus[b]	T	PR
	Southwestern willow flycatcher	Empidonax traillii extimus	E	D
	Abert's towhee	Melozone aberti		
	Arizona Bell's vireo	Vireo bellii arizonae		
Fishes	Longfin dace	Agosia chrysogaster		
	Desert sucker	Catostomus clarki		
	Sonora sucker	Catostomus insignis		
	Gila chub	Gila intermedia	E	D
	Gila topminnow	Poeciliopsis occidentalis occidentalis	E	
Amphibians	Chiricahua leopard frog	Lithobates chiricahuensis	T	D
	Lowland leopard frog	Lithobates yavapaiensis		
Reptiles	Desert box turtle	Terrapene ornata luteola		
	Sonoran desert tortoise	Gopherus morafkai		
	Tucson shovel-nosed snake	Chionactis occipitalis klauberi		
	Northern Mexican gartersnake	Thamnophis eques megalops	T	PR
	Giant spotted whiptail	Aspidoscelis stictogramma		
	Groundsnake (valley form)	Sonora semiannulata		
Invertebrates	San Xavier talussnail	Sonorella eremita	CA	
	Black Mountain/Papago talussnail	Sonorella ambigua syn. papagorum		
	Total Wreck talussnail	Sonorella imperatrix		
	Empire Mountain talussnail	Sonorella imperialis		
	Sonoran talussnail	Sonorella magdalensis syn. tumamocensis		
	Santa Rita talussnail	Sonorella walkeri		
	Pungent talussnail	Sonorella odorata syn. marmoris		
	Posta Quemada talussnail	Sonorella rinconensis		
	Santa Catalina talussnail subspecies	Sonorella sabinoenis buehmanensis		
	Santa Catalina talussnail subspecies	Sonorella sabinoensis tucsonica		
	Las Guijas talussnail	Sonorella sitiens sitiens		
	Tortolita talussnail	Sonorella tortillita		

[a] ESA status: E = Endangered; T= Threatened; PL = Proposed for listing by USFWS but has not been finalized; P = Petitioned for possible listing; C = Candidate; CA = Protected under a conservation agreement; D = Designated; PR = Proposed.
[b] Designated as a distinct population segment.
For additional information on these species, see Appendix A.

Using these criteria, the following will be considered a Covered Activity:

- Ground disturbances on individual, single-dwelling lots that occur subsequent to the County's issuance of a building permit that authorizes grading of 14,000 square feet or more provided that the property owner elects to participate in the County's Section 10 permit;

- Ground disturbances that occur as part of—and subsequent to—the development of a residential subdivision where such actions are subject to the County's issuance of a site construction permit provided the property owner elects to participate in the County's Section 10 permit after the submittal of the site construction permit application but prior to the County's issuance of the site construction permit (see Section 3.4.1.1);

- Ground disturbances that occur as part of—and subsequent to—the development of a non-residential facility where such actions are subject to the County's issuance of a site construction permit provided the property owner elects to participate in the County's Section 10 permit after submittal of the site construction permit application but prior to the County's issuance of the site construction permit (see Section 3.4.1.1);

- Activities of the County including construction, repair, maintenance, and operation of County facilities and infrastructure (see section 3.4.1.2 for details);

- Construction, operation, and maintenance of renewable energy generation projects located on County-owned lands leased to others specifically for that purpose;

- Relocation of utilities within County rights-of-way, where required by Pima County;

- Monitoring and land management activities including surveys, scientific studies, and other such activities carried out by Pima County and its cooperators for the purposes of this MSCP;

- Restoration activities such as vegetation treatments (including fire management activities) that are intended to improve the biological and ecological values; and

- Recreation activities authorized by Pima County; and

- County ranch-management activities—exclusive of livestock herbivory and trampling—on land owned by the County and lands managed by the County through grazing leases issued by the State of Arizona.

The County will cover up to approximately 36,000 acres of new ground-disturbing activities, which can come from any combination of Covered Activities. The County will reserve approximately 5,000 acres to cover its construction and maintenance activities; the remaining 31,000 acres is allocated for ground disturbances caused by private-sector development.

3.4.1 Additional Details on Select Covered Activities

This section provides additional details on Covered Activities.

3.4.1.1 Development on Private Property

Pima County proposes to provide Section 10 permit coverage to private development-related disturbances within the Permit Area. Permit coverage will be available through one of two avenues, described below. The County will grant permit coverage for development on private property on a first come, first serve basis.

3.4.1.1.1 Coverage for Individual, Single-Dwelling Residential Lots

Pima County will provide coverage for individual, single dwelling residential lots where the County issues a building permit that authorizes the grading of 14,000 square feet or more. Participation in the County's Section 10 permit is voluntary. However, the property owner will, by default, receive coverage unless the property owner declines Section 10 permit coverage at the time they apply for the building permit. This is referred to as the "Opt-out Provision."

If, at the time of building permit application, verification by the County confirms that coverage and mitigation under this MSCP have been previously provided for the individual, single dwelling residential lot, the property owner can no longer exercise the Opt-out Provision.

If permit coverage is to be provided, Pima County will bring the entire parcel under the protection of the Section 10 permit as if the entire parcel were to be disturbed, regardless of the amount of grading authorized by the building permit. A Certificate of Coverage will be issued to the property owner at the time they receive their building permit. Once inspection by County staff confirms that grading occurred, Pima County will provide mitigation, as necessary.

Pima County will provide coverage for the entire parcel the first time a building permit is issued where the property owner elects to not opt-out. This strategy provides certainty to the property owner that the planned disturbance and any potential authorized future disturbances will be fully mitigated.

3.4.1.1.2 Coverage for Residential Subdivisions and Non-residential Developments

If they so choose, any property owner who requires a site construction permit to develop their property as a residential subdivision or as a non-residential development can obtain coverage under the County's Section 10 permit provided certain criteria are met. Gaining coverage under the County's Section 10 permit in this manner is referred to as the "Opt-in Provision" and protects against unlawful take that may result from grading and development authorized by the site construction permit. The opportunity to opt-in is available pursuant to completion of an application process and confirmation that all of the following situations exist and conditions have been met:

- Section 10 permit coverage has not previously been granted for the entirety of that area within the limits of disturbance shown in the site construction permit;
- All owners of the area within the limits of disturbance shown in the site construction permit unanimously support the Opt-in Provision application;
- A site construction permit has been applied for but has not yet been issued by the County; and
- The County is in receipt of all applicable fees (see Section 4.5.2).

The County will also require those natural open-space areas created for compliance with the CLS conservation guidelines and those under *Chapter 16.30 – Watercourse and Riparian Habitat Protection and Mitigation Requirements* as applied to Important Riparian Areas to be used as Section 10 mitigation lands unless there are site-specific circumstances that render the set-aside unsuitable for use as mitigation. When the property owner elects to opt-in, the County will require suitable natural open space set-aside areas to be permanently protected through the recordation of a legally enforceable instrument acceptable to Pima County. This legally enforceable instrument must be executed before the County will issue a Certificate of Coverage. Other elements of receiving coverage through the Opt-in Provision are:

- Pima County will grant permit coverage and issue a Certificate of Coverage for only that area where grading and ground disturbance occurs, as shown in the site construction permit. Once inspection by County staff confirms that grading occurred, Pima County will provide necessary mitigation; and
- Applicant-provided geographic information system polygons will be used to track acres of grading and ground disturbance impacts, as well as acres reserved as mitigation lands when they are provided.

3.4.1.2 Details of Pima County Activities

County actions such as ongoing, non-capital projects (maintenance and repair of facilities in County rights-of-way, easements, and on other properties) and projects in the Capital Improvement Program (CIP) will be covered by the Section 10 permit. Appendix E lists CIP projects that are anticipated to be completed over the next 30 years.

Permit coverage will also extend to activities associated with the duties and operations of all Pima County departments (e.g., Sheriff, Transportation, Sustainability and Conservation, Regional Water Reclamation, Development Services, Health, Facilities Management, and Natural Resources, Parks and Recreation) and the activities of the Pima County Regional Flood Control District (RFCD). Unless otherwise noted, Covered Activities do not extend into adjacent counties.

Pima County Development Services' primary covered activity in relation to the MSCP is the issuance of building and site construction permits as described in Section 3.4.1.1.

Activities of the RFCD include alterations to federally mapped floodplains such as those proposed in Conditional Letters of Map Revision, and to non-federally mapped floodplains in the course of RFCD's construction and operation of flood and erosion control facilities. The RFCD intends that their watercourse maintenance activities, are covered activities for the purpose of this Section 10 permit. Construction and maintenance activities that may occur and typically require Corps of Engineers review and approval under Section 404 of the Clean Water Act include, but are not limited to, the following:

- Removal of sediment accumulation that restricts channel flow capacity;
- Re-shaping constructed drainage channels and basins;
- Bank stabilization/repair/rehabilitation in existing drainage ways;
- Repair/replacement of culverts;
- Construction of roads, driveways, and/or bike/equestrian paths;
- Construction of new grade control structures;
- Construction of new bank protection as part of the CIP;
- Construction of basins connecting to waters of the U.S. (WUS);
- Linear park pathways at wash crossings;
- Pedestrian underpasses and bridges;
- Constructed recharge facilities;
- Mechanized land clearing; and
- Any other discharge of dredged and/or fill material into WUS.

The RFCD responsibilities also include acquisition and management of floodprone lands, installation of stream and rain gages, and regulation of floodplain activities through a floodplain management ordinance. All of RFCD's activities, except for installation and maintenance of stream and rain gages in Santa Cruz and Pinal Counties, are located in Pima County.

Currently, the RFCD is responsible for over 15,000 acres. However, only a small portion of that is maintained on an annual to bi-annual basis depending on need and these activities generally occur in constructed facilities within urban areas. Remaining flood control facilities are inspected annually and maintenance is performed on an as-needed basis (typically every 3-5 years) or following flood events. RFCD maintenance activities that generally occur within Waters of the United States (WUS) that do not require a 404 permit typically include, but are not limited to; vegetation management such as mowing, trimming, spraying and invasive species removal where there is limited soil disturbance, vector control, trash and debris removal and fence repairs. See Section 3.5.1 for a description of how ESA consultation will be accomplished for Pima County and private covered activities that require a 404 permit.

These covered activities would be located on lands owned or maintained by Pima County or the RFCD and would comply with the Corps' compensatory mitigation requirements in 33 Code of Federal Regulations (CFR) Parts 325 and 332. Pima County and the RFCD each currently provide permittee-based compensatory mitigation for WUS impacts. Pima County or the RFCD may be authorized to operate an In-Lieu Fee or Mitigation Banking program for offsetting impacts on WUS in the Santa Cruz and

San Pedro watersheds. Currently, all recipients of Section 404 permits are fulfilling any obligations to provide compensatory mitigation for impacts to WUS individually and on a project-by-project basis. This method of satisfying mitigation for impacts to WUS is referred to as "permittee-based project mitigation." Once an In-Lieu Fee or Mitigation Banking program is operational in the Santa Cruz watershed, it would be the primary mechanism through which compensatory mitigation in the Santa Cruz watershed would be provided; permittee-based mitigation may still be used, but will become more the exception and not the rule.

Covered activities of the Department of Transportation include road widening and new road and bridge construction, and maintenance of existing roads, culverts and bridges. All of these activities are confined to Pima County, except for maintenance of the Arivaca Road in Santa Cruz County.

Covered activities of the Regional Water Reclamation Department include sewage conveyance, odor control, and sewage treatment in eastern Pima County and the Eagle Crest subdivision in Pinal County. The Department also recharges and stores treated effluent in underground storage facilities, otherwise known as recharge facilities in eastern Pima County.

Covered activities include recreation authorized by Pima County including activities at 41 urban parks, four shooting and archery ranges, 114 miles of trails, two campgrounds, trailhead parking, permits for access to Cienega Creek Natural Preserve and other County-managed parks, and activities described in leases, operating agreements, intergovernmental agreements and special-use permits. At present, Pima County has leased portions of the following sites to operators providing recreation, cultural and educational opportunities to the public:

- Southeast Regional Park;
- Tucson Mountain Park;
- Colossal Cave Mountain Park;
- Arthur Pack Park;
- Ajo Regional Park;
- Rillito Racetrack;
- Mike Jacobs Sports Park;
- Titan Missile Museum;
- Pima Air and Space Museum; and
- Mission Gardens.

Also covered are Pima County's park operations and authorized recreational activities, mainly at turf parks and trails, and on lands owned by school districts, State Trust land easements, municipalities, RFCD, and private entities. The permit area includes Pima County's operations in adjacent counties including parts of Tortolita Mountain Park (Pinal County), Sopori Ranch (Santa Cruz County), and A7 Ranch (Cochise County).

Any potential take of ESA-listed species by Pima County activities on Federal or tribal lands would be evaluated through the Section 7 process (as appropriate) and would be completed by the lead Federal agency. Therefore, County projects on Federal lands,

including within the Coronado National Forest (e.g., Mt. Lemmon Highway repairs and Summerhaven spray field modifications), Buenos Aires National Wildlife Refuge, Bureau of Reclamation and BLM land, and federally designated reservations are not proposed for Section 10 permit coverage.

3.4.1.2.1 Mosquito Control for Public Health

Pima County will, for purposes related to public health, continue to monitor and actively manage water bodies to control mosquito populations. Mosquitoes in southern Arizona are considered a public health nuisance because they are vectors for the West Nile virus and may, in the future, prove to be vectors for other life-threatening diseases such as dengue fever. To preserve public health, agencies in the region have employed a host of mosquito control methods, some of which include the use of fish and particularly the non-native mosquitofish (*Gambusia affinis*). Studies have shown that native fish, such as Gila topminnow and desert pupfish are just as effective as mosquitofish in controlling mosquito larvae in many public-health situations (Childs 2006). County staff, in coordination with USFWS staff, will continue to work to use native fish for anti-mosquito efforts and Pima County will be responsible for administering and implementing the mosquito control program in coordination and consultation with the Arizona Game and Fish Department (AGFD) and USFWS. Mosquito control by native fish would be included in the Riparian and Aquatic Species Management Plan. Baseline occurrence of these native fish species at specific sites will be established during the coordination process. Take of native fish species used for this purpose, which would return sites back to the established baseline, will be covered by the County MSCP and associated Section 10 permit.

3.4.1.2.2 Ranching Activities

Ranch activities that are authorized by Pima County such as construction and maintenance of infrastructure (e.g., construction of new stock waters, cattle guards, and fencing) on County-managed lands are covered under the Section 10 permit. These activities occur primarily in Pima County, however the permit area includes the portions of ranchland managed by Pima County in Santa Cruz, Pinal, and Cochise counties.

Activities by livestock (i.e., trampling and herbivory) on ranch lands will not be a Covered Activity. Even though impacts potentially related to the physical act of grazing are not being proposed for coverage under the MSCP, Pima County is committed to monitoring and managing its fee-owned and leased lands according to a strict set of standards and guidelines (Appendix F). These standards and guidelines will govern grazing on mitigation lands; details on implementation of standards and guides will be developed in consultation with the USFWS. Further, Pima County is not covering grazing because: 1) other, more quantifiable ranch management activities are being covered, (2) monitoring impacts on habitats and Covered Species resulting from cattle grazing is difficult and if done correctly would divert resources from other monitoring efforts, (3) there is minimal likelihood of needing species take coverage for this category, and (4) coverage could be made available later through a permit amendment if MSCP implementation and monitoring indicate it is appropriate. If necessary, take of Covered Species can be addressed through Section 7 consultations (for County leases

on Federal lands) or considered for inclusion in the Section 10 permit via the permit amendment process.

Pima County may implement a management program to improve resource conditions as compared to those present at the time of the County's lease or acquisition or at the time of permit issuance. If such a program proves to be successful, Pima County may seek to gain additional mitigation credit towards the County's mitigation requirements for the Section 10 permit (see Chapter 4). Resource improvement or enhancement actions by County staff or its agents are Covered Activities under the MSCP.

3.4.2 Activities Not Covered by the Permit

Activities not specifically proposed for coverage (as presented in Section 3.4) will not be covered by Pima County's Section 10 permit. These activities include but are not limited to:

- Grading of less than 14,000 square feet on individual, single dwelling lots;
- Ground-disturbing activities conducted on State Trust land by private or state parties, for which Pima County has no legal authority to control;
- Groundwater pumping or effluent discharges that increase, decrease, or otherwise alter water quality or quantity, except for groundwater pumping or effluent discharges carried out by Pima County covered by all required Federal permits;
- Actions on lands conserved as Section 7 (ESA) conservation lands set aside as part of a previous Section 7 consultation;
- Management, monitoring, or research within mitigation lands conducted by entities other than Pima County or its cooperators. This includes all activities of the Arizona Game and Fish Department. All researchers on County-managed lands are responsible for their own take permits, unless they are employees, contractors, or volunteers of Pima County;
- The physical act of grazing, specifically trampling and herbivory, by livestock on lands owned or leased by Pima County (see Section 3.4.1.2.2. for further explanation); and
- County activities located on Federal or tribal lands.

3.5 Additional Benefits of Implementing the MSCP

Implementation of the MSCP would benefit Federal land managers, as well as applicants for projects that have a Federal nexus, even though these entities would not be covered under the County's permit. Specific benefits could include:

- Potential for a reduced need to list additional species or designate critical habitat(s) within the Planning Area, thereby potentially reducing the need for additional Section 7 ESA consultations;

- A well-defined regional, ecologically based framework for meeting Section 7 requirements that facilitates a coordinated strategy in providing ecologically meaningful mitigation; and

- Opportunities to maximize the conservation benefits brought about by the Pima County MSCP including cross-jurisdictional collaboration for land conservation, monitoring, and management efforts.

3.5.1 Programmatic Consultation of Covered Activities for Section 404 Compliance

The MSCP would cover activities that would include the discharge of dredged and/or fill material into potentially jurisdictional WUS. The Corps can use the MSCP as a vehicle to consult programmatically on species effects that result from issuing certain permits under Section 404 of the Clean Water Act, to the extent that those permits address activities described in this MSCP and are located within the Section 10 Permit Area. The Federal agencies have discussed completing programmatic consultation on these Section 404 activities with the issuance of a Biological Opinion by the USFWS. (Programmatic consultation would be consolidated with the intra-Service Biological Opinion completed by USFWS for issuance of an Incidental Take permit to Pima County related to the MSCP). This would replace the project-by-project species consultation process that the Corps would use for "may affect" activities, thus streamlining the permitting process for Pima County and other entities obtaining coverage under the MSCP.

To assist the programmatic consultation, Pima County lists below those specific permits under Section 404 of the Clean Water Act that apply to covered activities and others who might elect coverage under Pima County's incidental take permit. The regional general permits (RGP) and nationwide (NW) permits included are the following:

- RGP 63 for emergency authorizations;
- RGP 81 maintenance and bank stabilization activities in Pima County;
- NW 3 maintenance;
- NW 7 outfall structures and associated intake structures;
- NW 12 utility line activities;
- NW 13 bank stabilization;
- NW 14 linear transportation;
- NW 18 minor discharges;
- NW 25 structural discharges;
- NW 27 aquatic habitat restoration, establishment and enhancement activities;
- NW 29 residential development;
- NW 31 maintenance of existing flood control facilities;
- NW 37 emergency water protection and rehabilitation;
- NW 33 temporary construction access and dewatering;
- NW 39 commercial and institutional development;
- NW 42 recreational facilities;

- NW 43 stormwater management facilities; and
- NW 46 discharges in ditches.

The effects of these proposed covered activities are discussed in Section 3.10.

3.6 Projected Spatial Footprint of Covered Activities

The principal direct effect of Covered Activities is the loss of habitat for Covered Species and the potential for those losses to effect populations of Covered Species. To help ascertain the extent and location of direct impacts caused by Covered Activities and to better quantify the County's potential mitigation obligation, Pima County developed a land absorption model (Appendix G) for three, 10-year permit phases. Growth projections for private-sector development within the Permit Area were combined with the estimated footprint of covered County projects to develop the overall projected spatial footprint of the proposed Covered Activities.

The land absorption model estimates that Covered Activities will impact approximately 13,500 acres in Permit Phase 1, 17,500 acres in Permit Phase 2, and 4,000 acres in Permit Phase 3. Projected impacts for all three permit phases are less than the total 36,000 acres requested in the permit (Table 3.2; Figure 3.2). These projected impacts are anticipated to occur on approximately 24,000 acres within the CLS and 11,000 acres outside of the CLS. Mitigation necessary to offset the direct effects of Covered Activities is discussed in Chapter 4.

Table 3.2. Projected acres of impacts to the CLS from Covered Activities in the Pima County MSCP Permit Area.

Relationship to CLS	CLS Category	Impacts in Permit Phase[a]			Total Impacts
		I	II	III	
Inside CLS	Biological Core Management Area	5,094	3,299	378	8,771
	Important Riparian Area	588	786	760	2,134
	Multiple Use Management Area	5,667	6,378	509	12,554
	Special Species Management Area[b]	67	111	113	291
	Agricultural In-holdings	0	0	1	1
	CLS Total[c]	11,415	10,575	1,762	23,752
Outside CLS		2,060	6,901	2,375	11,336
Total (CLS Total + Outside CLS)		13,475	17,476	4,137	35,088

[a] Permit phases: I = Permit years 1-10; II = Permit years 11-20; III = Permit years 21-30.
[b] Special Species Management Areas can overlap other CLS categories; however, these impacts fall solely within areas having Special Species Management Area on top of a Multiple Use, Agricultural or Outside of CLS designation.
[c] Because impacts are calculated to a fraction of an acre, there are rounding errors.

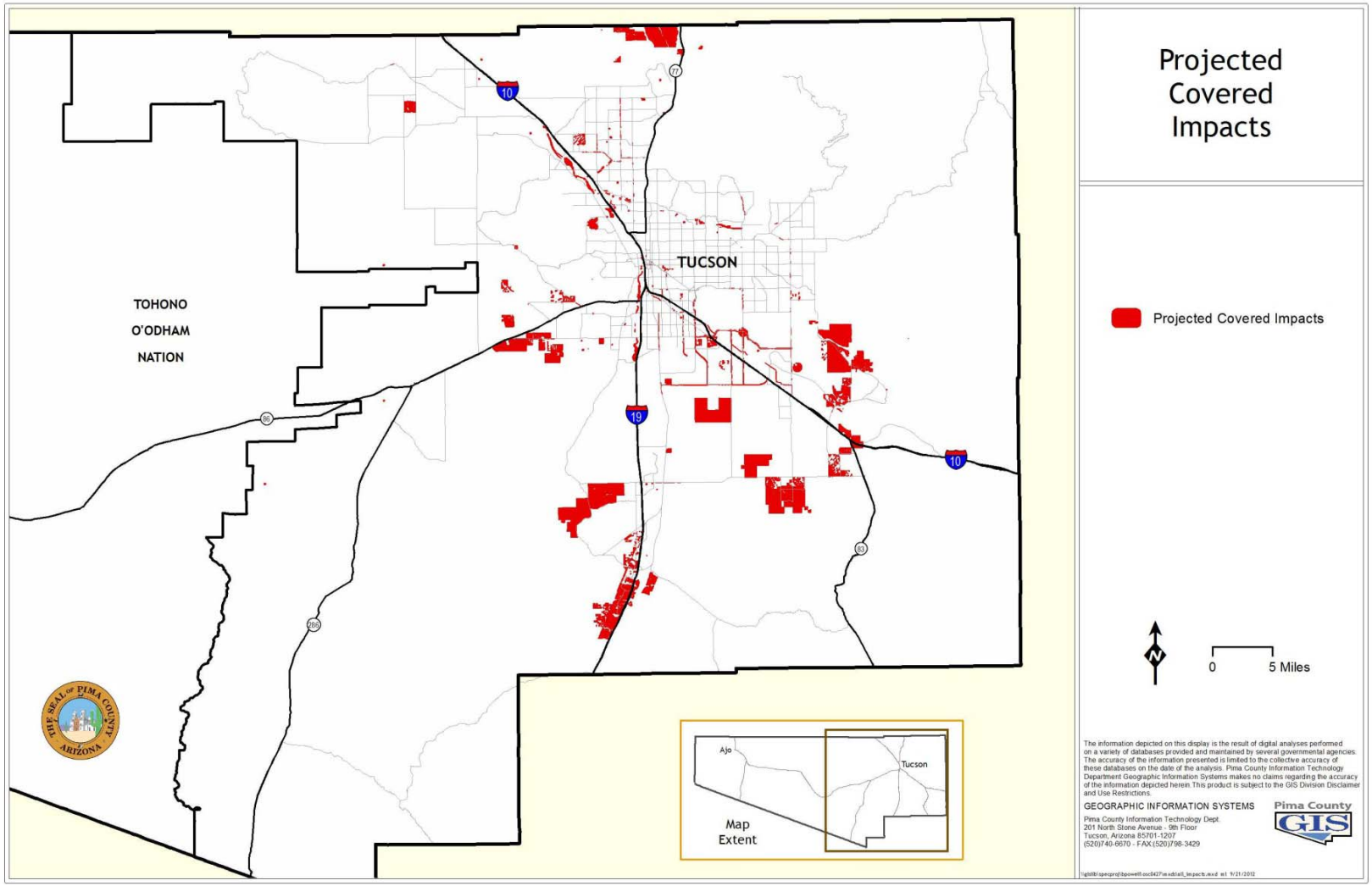

Figure 3.2. Impacts that are projected to occur as a result of Covered Activities in the Permit Area.
NOTE: Projected impacts are for analytical purposes and are not intended to be used for parcel-specific determination of permit coverage. The location and rate of development are likely to change during the 30-year permit.

3.7 Effects of the Pima County MSCP on Covered Species: Habitat Loss

3.7.1 Habitat as a Unifying Theme

Habitat is the place where species live and can include such characteristics as landform, elevation, soil, water, and vegetation. Each species has a unique template of what constitutes habitat for them and, therefore, the presence, absence, and abundance of a species on the landscape is largely determined by that habitat template. If key elements of a species' habitat are missing in an area, it can result in the loss of that species even if other environmental components necessary for a species' survival (e.g., food) are present. Consequently, most conservation actions that seek to promote populations of a species focus attention on maintaining or improving habitat. Creating ponds for amphibians and fish, using wildland fire to thin vegetation, and building nest boxes for birds are just a few examples of conservation actions that are focused on habitat.

Habitat plays an important role in the County's Section 10 permit. First, take is calculated based on the numbers of acres of habitat lost from Covered Activities (detailed below). Conversely, mitigation credit will be obtained by way of the number of acres of habitat protected by way of CLS mitigation (see Chapter 4).

For the purposes of this MSCP, "take" is calculated based on the number of acres of habitat lost for each Covered Species. Throughout the development of the SDCP and the MSCP, habitat has been mapped and calculated in two complementary ways: habitat modeling and designation of PCAs.

Habitat models were developed by species experts during the development of the SCDP and were based on broad-scale environmental features (e.g., hill slope, aspect, major vegetation type, soils) that were believed to control the distribution of each Priority Vulnerable Species at the landscape level (see Section 2.2.1). Using these habitat models, habitat suitability for each species was mapped using GIS for the entire geographic extent of Pima County, without regard to political boundaries. Habitat suitability was generally represented in geographic information systems (GIS) as "high," "medium," or "low." These habitat models advanced the state of knowledge for most Priority Vulnerable Species and were critical components in creating the reserve design process that resulted in the CLS. These models were developed for landscape-scale application and are not meant to provide site-specific analysis of habitat take.

By contrast, PCAs reflect the opinions of local species experts. PCAs identify those areas where land conservation activities, such as mitigation, should be prioritized to ensure the conservation of Priority Vulnerable Species (Pima County 2001d). While inexact and subject to periodic updates, PCAs are based on local knowledge and incorporate concerns for habitat quality, threats, and species population distributions.

The justification for using PCAs over modeled habitat to determine species take is that PCAs more closely represent the current and future habitat of Covered Species as

compared to modeled habitat. However, it is important to note that most PCAs overestimate currently occupied habitat so that estimates of occupied habitat loss from Covered Activities will be greater than actual occupied habitat loss. For example, the PCA for the Chiricahua leopard frog in Pima County is >400,000 acres whereas the species currently occurs in just a few, small and isolated sites that total <3,000 acres within the County. For the purposes of this MSCP, Pima County will use PCAs to calculate both take and mitigation for all but two species that do not have PCAs (the Sonoran desert tortoise and Tumamoc globeberry). For these two species, the County will use habitat models to calculate take and mitigation.

3.7.2 Take Calculations for the Pima County MSCP

As mentioned in the previous section, Pima County estimated habitat loss for Covered Species relative to the impacts on the PCAs or modeled habitat (high and medium quality; Table 3.3). Take estimates also include loss of habitat that exists within the built environment. Occurrences of the talussnail species are too localized to model using GIS (see Appendix A).

Projected habitat loss ranged widely, depending on species. For a few species (southwestern willow flycatcher, desert and Sonora suckers, and longfin dace), habitat loss was quantified to be zero acres; while habitat loss for four species (Pima pineapple cactus, Tumamoc globeberry, lesser long-nosed bat, and rufous-winged sparrow) was quantified at over 15,000 acres for each species (see Table 3.3). Appendix A provides individual maps of projected habitat loss for each species and, where appropriate, explains why take is anticipated for those species where no habitat loss is projected. Using habitat loss as a surrogate for anticipated take of the covered species in this MSCP is appropriate due to the direct connection habitat loss or fragmentation has to a species' ability to survive, reproduce, and move within the landscape to meet its life history requirements. See Appendix A for a discussion of how effects to habitat are related to the anticipated take of individual Covered Species.

3.8 Indirect Effects of Covered Activities

Indirect effects to Covered Species are those that occur later in time relative to the immediate undertaking of a Covered Activity, but are related to the Covered Activity's direct effect and are reasonably certain to occur. In general, habitat fragmentation and edge effects, which can vary considerably in type and magnitude, are the most significant indirect effects associated with Covered Activities. Other indirect effects to Covered Species and natural resources include: increased illumination from streetlights leading to changes in movement patterns and increased predation; greater potential for wildlife to be killed by vehicles; modification of ambient noise levels; changes in water-use patterns; exacerbation of air pollution; increased level of human activities (e.g., greater off-road recreational use); greater access to previously less- or undisturbed areas; and introduction of free-roaming/feral pets and invasive species into areas where they previously did not occur. Indirect effects may also be beneficial such as the foreseeable improvement to the quality of effluent discharge to the Santa Cruz River from treatment plant upgrades at the Agua Nueva and Tres Rios wastewater treatment facilities.

Table 3.3. Acres of habitat loss projected to occur as a result of Covered Activities within the Permit Area.

Species	Potential loss after 30 years
Pima pineapple cactus	18,963
Needle-spined pineapple cactus	852
Huachuca water umbel	364
Tumamoc globeberry	19,434
Mexican long-tongued bat	5,735
Western red bat	178
Western yellow bat	48
Lesser long-nosed bat	15,978
California leaf-nosed bat	111
Pale Townsend's big-eared bat	1,525
Merriam's mouse	330
Western burrowing owl	1,392
Cactus ferruginous pygmy-owl	7,394
Rufous-winged sparrow	19,108
Swainson's hawk	10,981
Yellow-billed cuckoo	28
Southwestern willow flycatcher	0[a]
Abert's towhee	554
Arizona Bell's vireo	72
Longfin dace	0[a]
Desert sucker	0[a]
Sonora sucker	0[a]
Gila chub	0.1
Gila topminnow	0.5
Chiricahua leopard frog	2
Lowland leopard frog	7,145
Desert box turtle	748
Sonoran desert tortoise	9,473
Tucson shovel-nosed snake	63
Northern Mexican gartersnake	3,210
Giant spotted whiptail	4,355
Groundsnake (valley form)	11

NOTE: Talussnails were not part of this analysis because of their localized distribution. Habitat loss was calculated using Priority Conservation Areas for all species except the Tumamoc globeberry and the Sonoran desert tortoise, for which loss was calculated using modeled habitat (see text for more information).
[a]No effects to habitat are anticipated to result in take, but direct (i.e., lethal) take is possible. See Appendix A.

3.9 Effects of the Pima County MSCP on Critical Habitat

Critical habitat is currently designated for four species in Pima County, and is proposed for two species (see Table 3.1). Additional critical habitat designations may be finalized prior to permit issuance. Appendix A provides a narrative of the impacts that Pima County's MSCP may have on designated or proposed critical habitat for covered, listed species. Additional critical habitat analyses can be found in Section 3.10 for projects that may have a Federal nexus through Section 404 of the Clean Water Act.

Section 4(a)(3) of the Act provides for the designation of "critical habitat" for endangered and threatened species at the time such species are listed, and section 7(a)(2) requires Federal agencies to ensure that their actions are not likely to adversely modify or destroy critical habitat. Effects to designated critical habitat within the Permit Area will be evaluated through section 7 of the ESA and the associated Biological Opinion.

Designation of critical habitat for Covered Species—for which critical habitat is not designated at the time that USFWS completes the Biological Opinion for Pima County's Section 10 permit—would be considered a changed circumstance (Table 7.1). In these cases, no further action by Pima County is needed (see Table 7.1). However, the USFWS would evaluate the need to reinitiate consultation based on effects of the implementation of the MSCP on any future critical habitat designations. In the process, the USFWS would consider the adequacy of the existing Biological Opinion in considering the effects of covered activities on the critical components of the species' habitat in the areas included in these future designations of critical habitat. If the effects on critical habitat were considered in the existing Biological Opinion, reinitiation of the consultation would not be needed. If the USFWS had not considered the effects in the Biological Opinion, and the effects are deemed "adverse modification" of critical habitat, then the USFWS could recommend reinitiation of consultation considering amendments to the permit agreed to in coordination with Pima County to either avoid adverse modification, or to remove the species from the County's incidental take permit.

If critical habitat is designated for species that are not covered under the permit, but which are likely to be impacted by Pima County's covered activities, Table 7.1 describes the options available to Pima County.

3.10 Covered Impacts to WUS and Use of the MSCP for Programmatic Consultation with the Corps

Pima County and the RFCD are attempting to streamline one aspect of the Section 404 Clean Water Act permit process by using the MSCP as a means of concurrence by the USFWS on species impacts of covered activities that would be authorized under certain Section 404 permits. A programmatic consultation could speed one step of the Corps Section 404 permitting process for covered Activities needing certain Nationwide (NW) or Regional General Permits (RGPs).

To inform this process, Pima County analyzed impacts on species habitats within WUS as part of the MSCP, using the same model of projected development as was used for other habitat impacts described within the MSCP. WUS impacts are a subset of habitat

impacts resulting from Covered Activities under the MSCP. Appendix G explains assumptions made regarding the extent of WUS for the purposes of a habitat effects analysis. The actual extent of WUS would need to be identified project-by-project with a preliminary or approved jurisdictional delineation. Species habitat maps are used to help understand the impacts that activities within WUS would have on Covered Species and other threatened and/or endangered species

As discussed in Appendix G, uncertainty exists with regards to the exact location, extent, and severity of future disturbance, particularly with respect to private Covered Activities. Disturbances to WUS by the County's public-sector Covered Activities are better known (see Appendix G) and often take place in areas that are already disturbed, such as along the Santa Cruz River (Figure 3.3), which contains bank protection and other features of past disturbance. Here, some of the new, covered impacts are anticipated to be temporary and the results of the impacts will actually improve conditions for some species (see Appendix E for list of bond projects along the Santa Cruz River; many of these projects have an ecological restoration component to them).

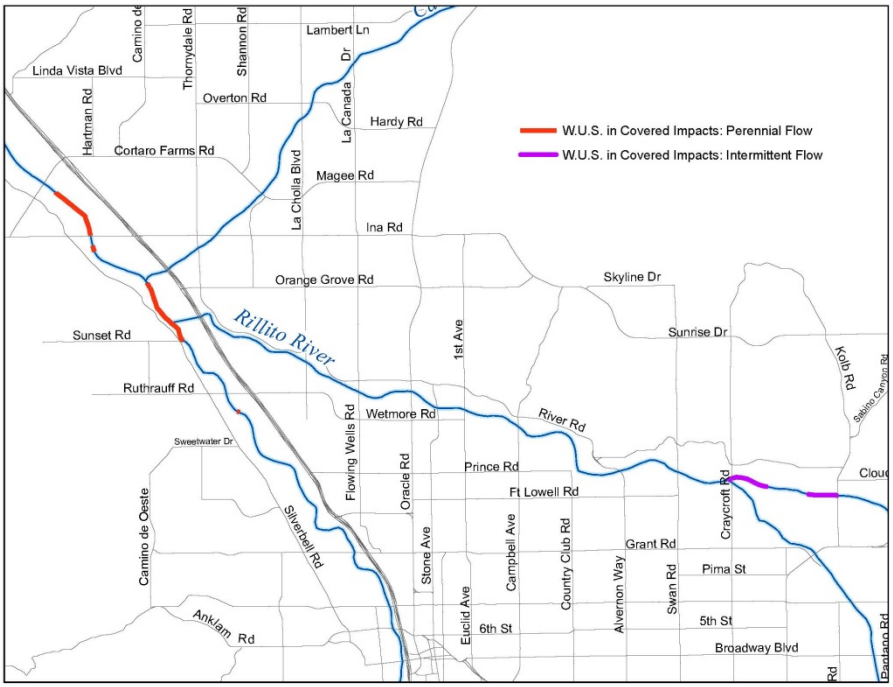

Figure 3.3. Location of covered impacts to potentially jurisdictional WUS within the Pima County Permit Area.
NOTE: These impacts are a subset of impacts shown in Figure 3.2.

Another source of uncertainty is that some Covered Activities that impact WUS may require Individual 404 permits from the Corps and thus will be consulted upon separately through the Section 7 process, not under the process detailed in this MSCP Section 10 permit. At the time of each Individual 404 permit application, further analysis will be provided to the Corps regarding project extent and level of impacts. As a result, the project footprint may be reduced and therefore the current estimate of direct impacts

may overestimate final project impacts, and as such represent a baseline, "worst case" scenario for assessing impacts.

Based on the modeling exercise, there is estimated to be approximately 700 acres of direct impacts attributable to Covered Activities in WUS. Impacts to species' habitat range from 0 acres for eight species to 357 acres for the Tumamoc globeberry (see Table 3.3). Impacts to the total number of acres of habitat in Pima County resulting from impacts to WUS range from 0% (for 15 species) to 0.15% (for the Huachuca water umbel). Finally, the amount of habitat disturbed by projects that impact WUS as a percentage of the total anticipated impacts resulting from Covered Activities under the MSCP range from 0% (for nine species) to 36% (for the yellow-billed cuckoo).

A closer look at individual species reveals some important information about the impacts and the modeling exercise in general. First, in any ground-disturbance project within an aquatic system, there are some disturbances on adjacent upland areas, but the modeling likely overestimates impacts to species that occur outside of the impacts to WUS because these species, such as the Tumamoc globeberry, Pima pineapple cactus, and the lesser long-nosed bat, are over-represented (in the models) in these areas. This is likely because the boundaries for some habitat models (globeberry, for example) and PCAs (Pima pineapple cactus, for example) did not exclude riparian areas in which these species have little to no likelihood of occurring; the models were never meant to map that level of detail.

Other species that are currently listed under the ESA and for which there are modeled, direct impacts are also worth mentioning. The Huachuca water umbel is estimated to have almost 52 acres of impacts, but the species is not known to currently occur in the area of impacts to the WUS. Instead, these areas are considered to be habitat because it is hoped that they might provide habitat in the future, perhaps if, for example, water quality improves along the Santa Cruz River. Similarly, yellow-billed cuckoos are not found in the area of impact, but may occur if habitat conditions improve along the Santa Cruz River. Additionally, no impacts are projected to occur for the northern Mexican gartersnake or Chiricahua leopard frog because they do not occur in this area.

In addition to direct effects from Covered Activities that would also impact WUS, there are also indirect effects such as changes in hydrological functions or reduction in channel meandering that might occur as a result of the Covered Activity (see Section 3.8). These indirect and cumulative effects would likely result in changes to geologic features, streambed elevation, soil conditions, conveyance capacities, and/or flow patterns of watercourses. This is especially true along the Pantano Wash where the County is planning to construct bank protection infrastructure. To help minimize and mitigate for these impacts, Pima County will implement a series of conservation measures, which are highlighted in Section 4 of this MSCP.

In general, the number of acres of disturbance and direct effects resulting from impacts to the WUS modeled here are quite small in comparison to the impacts resulting from the full list of Covered Activities under the MSCP (Table 3.4). Considering that many of the impacts to the WUS will actually be relatively short-lived and many positive results

are likely to come from the activities that cause the impacts, it effectively reduces impacts to species that are listed in Table 3.4.

Table 3.4. Summary of the modeled impacts to Waters of the U. S. (WUS) on Covered Species.

Species	Column A: Total Acres of Habitat or Critical Habitat in Pima County[a]	Column B: Acres Impacted by MSCP Covered Activities	Column C: Acres in impacted WUS	% of MSCP Impacts that are also impacted by Activities affecting WUS (C÷B)	% of Total Acres in Pima County Affected by Impacts in WUS (C÷A)
Pima pineapple cactus	581,823	18,963	317.6	1.7	0.05
Needle-spined pineapple cactus	44,172	852	9.5	1.1	0.02
Huachuca water umbel	35,608	364	51.7	14.2	0.15
Tumamoc globeberry	1,600,041	19,434	357.4	1.8	0.02
Mexican long-tongue bat	561,907	5,735	85.7	1.5	0.02
Western red bat	512,767	178	0.1	0.0	0.00
Western yellow bat	147,749	48	13.9	28.9	0.01
Lesser long-nosed bat	1,532,724	15,978	210.3	1.3	0.01
California leaf-nosed bat	542,813	111	1.9	1.7	0.00
Pale Townsend's big-eared bat	306,520	1,525	16.6	1.1	0.01
Merriam's mouse	119,584	330	4.1	1.2	0.00
Western burrowing owl	216,161	1,392	137.7	9.9	0.06
Cactus ferruginous pygmy-owl	1,264,335	7,394	168.9	2.3	0.01
Rufous-wing sparrow	893,606	19,108	284.4	1.5	0.03
Swainson's hawk	923,310	10,981	169.1	1.5	0.02
Yellow-billed cuckoo	56,990	28	10.2	36.4	0.02
Southwestern willow flycatcher	14,364	0	0.0	0.0	0.00
Abert's towhee	78,081	554	53.8	9.7	0.07
Arizona Bell's vireo	63,672	72	24.0	33.3	0.04
Longfin Dace	19,853	0	0.0	0.0	0.00
Desert Sucker	9,167	0	0.0	0.0	0.00
Sonora Sucker	10,492	0	0.0	0.0	0.00
Gila chub	32,225	0.1	0.0	0.0	0.00
Gila Topminnow	21,877	0.5	0.0	0.0	0.00
Chiricahua leopard frog	403,425	2	0.0	0.0	0.00
Lowland leopard frog	582,906	7,145	231.2	3.2	0.04
Desert box turtle	295,202	748	129.9	17.4	0.04
Sonoran desert tortoise	1,953,400	9,473	73.9	0.8	0.00
Tucson shovel-nosed snake	87,787	63	0.1	0.1	0.00
Northern Mexican gartersnake	157,075	3,210	185.1	5.8	0.13
Giant spotted whiptail	330,917	4,355	186.2	4.3	0.06
Groundsnake (valley form)	39,600	11	0.1	0.6	0.00

[a] Numbers are for MSCP (PCAs or modeled habitat) acres.
NOTE: Habitat is described in Section 3.7.1. This analysis is an approximation of the impacts that might occur. See text for more information.

4 AVOIDANCE, MINIMIZATION, MITIGATION AND IMPLEMENTATION OF THE CONSERVATION PROGRAM

This chapter examines the measures that Pima County will employ to avoid, minimize, and mitigate impacts to species and their habitats from two perspectives. The first is a retrospective examination of those avoidance, minimization, and mitigation measures that the County has been implementing to support SDCP goals. Many of these measures are long-standing aspects of the development process in Pima County and have been in existence for well over a decade or more. These actions are anticipated to continue into the future during the life of the Section 10 permit. The second presents those more precise components of these avoidance, minimization, and mitigation measures that are being applied for purposes of SDCP implementation and which the County will rely on for purposes of obtaining and complying with the terms of the Section 10 permit.

4.1 Avoidance and Minimization – SDCP Retrospective

Pima County's SDCP conservation strategy operates at spatial scales ranging from the regional landscape scale to the site-specific project scale and incorporates avoidance and minimization as well as mitigation measures. At the landscape scale, the CLS map—by identifying those areas that are most suitable for development, as well as those areas where development is least desirable—is the County's most definitive tool and is used to direct development-related impacts away from sensitive resources. At the site-specific, project scale, most projects (regardless of whether they are in or out of the CLS) are subject to protocols or regulations that seek to avoid, minimize, or mitigate impacts to on-site sensitive resources (e.g., floodplains, riparian areas, native vegetation) as well as promote a project design that avoids and/or minimizes impacts to off-site resources (e.g., surface and groundwater).

As part of the SDCP, a number of existing regulations or standards were modified to improve species protections. Even before the SDCP, Pima County had developed and honed a host of ordinances and other administrative tools to protect scenic beauty, cultural resources, and wildlife habitat. Continued implementation of certain aspects of these commitments will specifically benefit Covered Species and their habitats and Pima County will rely on these commitments to avoid and minimize future impacts to Covered Species. These specific, permit-related avoidance and minimization measures are described in Table 4.1.

Table 4.1. Existing Pima County regulations and protocols that avoid and minimize impacts to scenic, cultural, and wildlife resources.

Pima County Controlling Document	MSCP Rationale	Relevant Sections of Pima County Controlling Document)	Modification(s) that Trigger Notification (Changed Circumstances)
Pima County Code Chapter 7.33 - Removal of Rubbish, Trash, Weeds, Filth and Debris	Supports control and eradication of exotic, invasive plant species.	7.33.010.A.4. - "Weed" includes any species of plant that is listed in Arizona Administrative Code R3-4-244, including *Pennisetum ciliare* (L.) Buffelgrass *(Ord. No. 2008-117, § 1 (part), 2009)*	Remove buffelgrass from definition of "weed"
		7.33.020 - Removal. The owner, lessee or occupant of property shall remove all rubbish, trash, weeds, filth, debris, and dilapidated buildings that constitute a hazard to public health and safety from the property and contiguous areas. *(Ord. No. 2008-117, § 1 (part), 2009)*	Remove requirement for property owners or occupants to remove buffelgrass from their property and contiguous areas.
Pima County Code Chapter 16.30 - Watercourse & Riparian Habitat Protection & Mitigation Requirements	Conserves riparian resources and requires mitigation for unavoidable impacts.	16.30.030 - Applicability. This chapter shall apply to all properties within unincorporated Pima County that contain riparian habitat, as delineated on riparian habitat maps adopted by the board. This chapter shall apply to the county, the district, and to all parties acting on behalf of the district and county. This chapter shall apply to individual building permits, including grading permits issued by the county, and land development permits associated with subdivisions and development plans. All requirements of this chapter shall apply to regulated hydroriparian, mesoriparian, important riparian areas, and, xeroriparian Classes A, B, C, and D habitat. *(Ord. 2005 FC-2 § 2 (part), 2005; Ord. 1999 FC-1 § 1 (part), 1999; Ord. 1998 FC-1 Section 3, 1998; Ord. 1994 FC-2 (part), 1994: Ord. 1988 FC-2 Art. 10 (C), 1988)*	Amend the entities whose actions are subject to this regulation *OR* the types of permits that are subject to this regulation
		16.30.060 - Review Process. The application and any proposed mitigation plan shall be evaluated by the effectiveness in: A. Avoiding the impact; B. Minimizing the impact; C. Rectifying the impact; D. Reducing or eliminating the impact over time; and E. Compensating for the impact. *(Ord. 2005 FC-2 § 2 (part), 2005; Ord. 1999-FC-1 § 1 (part) 1999; Ord. 1994 FC-2 (part), 1994: Ord. 1988 FC-2 Art. 10 (F), 1988)*.	Amend the criteria used to evaluate the effectiveness of mitigation.
		16.30.080.A - Riparian classification maps shall be adopted by resolution of the Board and shall detail on a parcel level, the general location of riparian habitat and important riparian areas subject to the requirements of this chapter. *(Ord. 2010-FC5 § 1 (part), 2010; Ord. 2005 FC-2 § 2 (part), 2005; Ord. 1999 FC-1 § 1 (part), 1999; Ord. 1995 FC-1 §§ 1, 2, 1995)*	Amend Riparian Classification Maps

Table 4.1. Existing Pima County regulations and protocols that avoid and minimize impacts to scenic, cultural, and wildlife resources.

Pima County Controlling Document	MSCP Rationale	Relevant Sections of Pima County Controlling Document)	Modification(s) that Trigger Notification (Changed Circumstances)
16.26 - Floodway Fringe Area Requirements	Minimizes alteration of flow velocity in the floodplain. Massive changes in velocity can adversely alter habitat (bank stability, vegetation density and types, availability of water) for many Covered Species	16.26.020 - Conditions applicable to all uses. C. No encroachment may increase the base flood level more than one-tenth of a foot or increase flood velocities more than ten percent or one fps, whichever is less, at any property line, except when it can be demonstrated that the post-development velocity is not an erosive velocity. The velocity subject to this standard may be the overbank velocity, the channel velocity, or both, as appropriate based on the type of development and its location within the floodplain. *(Ord. 2010-FC5 § 1 (part), 2010; Ord. 2005 FC-2 § 2 (part), 2005; Ord. 1999 FC-1 § 1 (part), 1999; Ord. 1988 FC-2 Art. 9 (B) (part), 1988)*	Weaken thresholds for the one-tenth of a foot base flood level; *OR* the ten percent flood velocity; *OR* one fps.
Pima County Code 16.28 - Erosion Hazard Areas and Building Setbacks	Minimizes alteration of areas adjacent to channel banks and encourages leaving banks natural, which reduce impacts to habitat for a variety of Covered Species, including the desert tortoise	16.28.020 - Setbacks near major watercourses. B. Along natural channels where no unusual conditions exist (such as a pronounced channel curvature), the default building setback for erosion hazard protection shall be: 1. A distance of five hundred feet along the Santa Cruz River, Rillito Creek, Pantano Wash, Tanque Verde Creek, San Pedro River, and the Canada del Oro Wash; 2. A distance of two hundred fifty feet along major watercourses with base flood peak discharges greater than ten thousand cublic feet per second (cfs); 3. A distance of one hundred feet along all major watercourses with base flood peak discharges of ten thousand cfs or less, but more than five thousand cfs; and 4. A distance of seventy-five feet along all other major watercourses with base flood peak discharges of five thousand cfs or less, but more than or equal to two thousand cfs. *(Ord. 2010-FC5 § 1 (part), 2010; Ord. 2005 FC-2 § 2 (part), 2005; Ord. 1999 FC-1 § 1 (part), 1999; Ord. 1988 FC-2 Art. 12 (A), 1988).*	Amend the default setback distances from major and minor watercourses
		16.28.030 - Setbacks from minor watercourses. A. For minor natural washes with a base flood peak discharge of less than two thousand cfs, the following building setbacks shall be required: 1. A distance of fifty feet for watercourses with base flood peak discharges of less than two thousand cfs, but more than five hundred cfs; 2. A distance of twenty-five feet for watercourses with base flood peak discharges of five hundred cfs to one hundred cfs;	Amend the default base flood peak discharge thresholds for major and minor watercourses *OR* amend the list of major watercourses that are identified by name.

Table 4.1. Existing Pima County regulations and protocols that avoid and minimize impacts to scenic, cultural, and wildlife resources.

Pima County Controlling Document	MSCP Rationale	Relevant Sections of Pima County Controlling Document)	Modification(s) that Trigger Notification (Changed Circumstances)
		3. Alternative safe limits for erosion setbacks approved in writing by the chief engineer based on an acceptable engineering study prepared and sealed by an Arizona registered civil engineer. However, at no time shall a setback of less than twenty-five feet from the top of channel bank be permitted in order to provide for reasonable access and stability of nearby structure foundations, except as allowed pursuant to subsection B of this section. *(Ord. 2010-FC5 § 1 (part), 2010; Ord. 2005 FC-2 § 2 (part), 2005; Ord. 1999-FC-1 §§ 1 (part) 1999; Ord. 1988-FC2 Art. 12 (B), 1988)*	
Pima County Code 18.61 - Hillside Development Overlay Zone	Minimizes development on slopes that provide habitat for tortoise, talussnails, and other Covered Species.	18.61.030 - Applicability. A. Applicable Lands. 1. This chapter applies to any land parcel, lot, or project site containing slopes of fifteen percent (15%) or greater, which are both longer than fifty feet (50') when measured in any horizontal direction and higher than seven and one-half feet (7.5') when measured vertically. *(Ord. 2003-17 § 1 (part), 2003; Ord. 2000-52 § 1 (part), 2000)*	Weaken the fifteen percent minimum slope that triggers compliance with Chapter 18.61
		18.61.030 - Applicability. B. Prohibited Development. 1. A rezoning to TR, RVC, CB1, CB2, CPI, CI1, CI2 or CI3 zone is not permitted on a land parcel, lot, or project site having an average cross slope of fifteen percent (15%) or greater. 2. Nonresidential conditional uses (refer to Chapter 18.97) within a rural or residential zone are not permitted on land parcels, lots or project sites having average cross slopes of fifteen percent (15%) or greater. 3. A rezoning for residential uses with overall densities greater than 1.20 residences per acre is not permitted on land parcels with an average cross slope greater than fifteen percent (15%) prior to the exclusion of any natural area. *(Ord. 2003-17 § 1 (part), 2003; Ord. 2000-52 § 1 (part), 2000)*	Amend the types of development that are prohibited
		Table 18.61.052-1. Average Cross Slope (%) / Average Area (acres) per Dwelling Unit (density) 15 1.0 16 1.12 17 1.25 18 1.37 19 1.5 20 2.0 21 2.25 22 2.5 23 3.5	Amend the Average Area (acres) per Dwelling Unit (density) for projects or parcels with average cross slopes of fifteen percent or greater

Table 4.1. Existing Pima County regulations and protocols that avoid and minimize impacts to scenic, cultural, and wildlife resources.

Pima County Controlling Document	MSCP Rationale	Relevant Sections of Pima County Controlling Document)	Modification(s) that Trigger Notification (Changed Circumstances)
		24 4.5 25 6.0 26 7.0 27 8.6 28 10.4 29 12.8 30 16.0 31 23.5 32 31.0 33 and greater 36.0 *(Ord. 2001-22 § 2, 2001; Ord. 2000-52 § 1 (part), 2000)*	
Pima County Code 18.72 - Native Plant Preservation Ordinance	Encourages preservation in-place and requires mitigation for unavoidable impacts. Directly contributes to the conservation of Covered Plant Species (Pima pineapple cactus, needle-spined pineapple cactus, and Huachuca water umbel) and conserves saguaro and ironwood that are habitat components for other Covered Species including cactus ferruginous pygmy-owl, Mexican long-tongued bat, lesser long-nosed bat, and rufous-winged sparrow.	Table 18.72.040-1: Protected Native Plants Table 18.72.040-1B: Arizona Safeguarded Species (Ord. 1998-39 § 1 (part), 1998)	Remove Pima pineapple cactus, needle-spined pineapple cactus, Huachuca water umbel, saguaro, or ironwood from list of species regulated by 18.72

Table 4.1. Existing Pima County regulations and protocols that avoid and minimize impacts to scenic, cultural, and wildlife resources.

Pima County Controlling Document	MSCP Rationale	Relevant Sections of Pima County Controlling Document)	Modification(s) that Trigger Notification (Changed Circumstances)
		18.72.050 - Applicability and Exceptions. A. Applicability. Except as provided in paragraph B below, the requirements of this chapter apply to all development for which any of the following conditions apply: 1. On sites for which a grading plan is required or the total area covered by all grading permits is fourteen thousand (14,000) square feet or more; 2. On sites for which approval of a development plan or subdivision plat is required and for which a tentative plat or development plan is first submitted: a. After the effective date of this chapter; or b. Prior to the effective date of this chapter and for which a final plat or development plan is not approved within one (1) year of the effective date of this chapter. 3. On sites with a subdivision plat or development plan that was approved more than one (1) year prior to the effective date of this chapter and for which permitted on-site infrastructure construction for at least one (1) of the following major site improvement categories has not commenced prior to the effective date of this chapter and has not been completed within one (1) year of the effective date of this chapter: a. Mass grading and drainage improvements; b. Water or sewer mains or treatment facilities; or c. Major streets. *(Ord. 1998-39 § 1 (part), 1998)*	Amends the applicability criteria
		Table 18.72.090-1: Preservation Requirements & Preservation Credits	Amends mitigation ratios for Pima pineapple cactus, needle-spined pineapple cactus, Huachuca water umbel, saguaro, or ironwood
Pima Prospers -Pima County Comprehensive Plan 2015 Update	Used to determine the mitigation ratio necessary to off-set development impacts and informs the selection of mitigation lands. It also yields natural open space on Private Property that will be used for Mitigation Land	Conservation Lands System Policies and Map as Adopted in Resolution No. 2015-62 and 2015-78 Chapter 3 – Use of Land; Section 3.4.; Goal 1; Policy 1 – Policy 13; Chapter 3 – Use of Land; Section 3.4.; Goal 1; CLS Maps -- Exhibits 3.4.1. & 3.4.2; Chapter 10 – Comprehensive Plan Administration: Section10.13; Appendix E – Glossary; Definitions for the following: • Agriculture In-Holdings within the CLS • Biological Core Management Area • Critical Landscape Connections • Important Riparian Areas • Multiple Use Management Areas • Scientific Research Areas • Special Species Management Areas	-Revise Policies 1-13; -Revise Exhibits 3.4.1. & 3.4.2; -Revise Section 10.3 establishing any change to CLS definitions in Appendix E as non-substantial changes; removal of requirement for public hearings at Planning & Zoning Commission and Board of Supervisors; -Revise definitions of CLS categories in Appendix E.

Table 4.1. Existing Pima County regulations and protocols that avoid and minimize impacts to scenic, cultural, and wildlife resources.

Pima County Controlling Document	MSCP Rationale	Relevant Sections of Pima County Controlling Document)	Modification(s) that Trigger Notification (Changed Circumstances)
Pima County Rezoning Application and Site Analysis Requirements - July 2, 1985 (as amended March 16, 2010)	Provides on-site information for biological resources that informs configuration of high-value natural open space set-asides that may be used as mitigation lands. Natural open space that conserves on-site biological resources benefits Covered Species including cactus ferruginous pygmy-owl, Mexican long-tongued bat, lesser long-nosed bat, and rufous-winged sparrow.	Site Analysis - Part 1: Site Inventory. I-D. 3. If all or a portion of the site falls within the Priority Conservation Area for the Pima pineapple cactus, as displayed on Sonoran Desert Conservation Plan (SDCP) MapGuide, conduct a survey for that species. Staff will allow this information to be carried over for future Native Plant Preservation Plan submittals for up to five years provided that the survey shall be conducted by an entity qualified to perform biological surveys, and performed according to the most recent protocol approved by the US Fish & Wildlife Service. The property owner may request an extension of the five-year time limit at the time of a request for a time extension of the approved rezoning. The property owner must provide written justification for the extension with the application for the time extension and the Planning Director or his/her designee will review the request on a case-by-case basis at the time of application for a time extension. Existing survey data can be used provided that the surveys were conducted no more than one year prior to the initial submittal of the rezoning application. Summarize survey results and map approximate locations of any Pima pineapple cactus found. (If cacti are found, as a courtesy, please provide this information to the Arizona Game & Fish Department's Heritage Data Management System.)	Remove the requirement to survey for Pima pineapple cactus when the project site falls within PCA for this species.
		Site Analysis - Part 1: Site Inventory. I-D. 4. If all or a portion of the site falls within the Priority Conservation Area for the needle-spined pineapple cactus, as displayed on Sonoran Desert Conservation Plan (SDCP) MapGuide, conduct a survey for that species. Staff will allow this information to be carried over for future Native Plant Preservation Plan submittals for up to five years provided that the survey shall be conducted by an entity qualified to perform biological surveys. The property owner may request an extension of the five-year time limit at the time of a request for a time extension of the approved rezoning. The property owner must provide written justification for the extension with the application for the time extension and staff will review the request on a case-by-case basis at the time of application for a time extension. Existing survey data can be used provided that the surveys were conducted no more than one year prior to the initial submittal of the rezoning application. Summarize survey results and map approximate locations of any needle-spined pineapple cactus found. (If cacti are found, as a courtesy, please provide this information to the Arizona Game & Fish Department's Heritage Data Management System.)	Remove the requirement to survey for needle-spined pineapple cactus when the project site falls within PCA for this species.

Table 4.1. Existing Pima County regulations and protocols that avoid and minimize impacts to scenic, cultural, and wildlife resources.

Pima County Controlling Document	MSCP Rationale	Relevant Sections of Pima County Controlling Document)	Modification(s) that Trigger Notification (Changed Circumstances)
		Site Analysis - Part 1: Site Inventory. I-D. 7. Inventory and map all saguaros (grouped into two size classes: ≤6 feet and >6 feet tall) and ironwood trees that occur on site, if any. Sampling may be appropriate for certain properties, pending staff approval. Staff will allow an inventory (not a sampling) of individual ironwood trees and saguaros to be carried over for future Native Plant Preservation Plan submittals for up to five years. The property owner may request an extension of the five-year time limit at the time of a request for a time extension of the approved rezoning. The property owner must provide written justification for the extension with the application for the time extension and staff will review the request on a case-by-case basis at the time of application for a time extension.	Remove the requirement to inventory or sample survey for saguaro and ironwood
		Site Analysis - Part 1: Site Inventory. I-C. 4. Describe and map the characteristics of the on-site hydrology. Include all of the following, if applicable: a. 100-year floodplains with a discharge greater than or equal to 100 cfs, with justification for these delineations; b. Sheet-flooding areas with their average depths; c. Federally mapped floodways and floodplains; d. Peak discharges both entering and leaving the site for 100-year events which exceed 100 cfs, with justification for the values provided. e. All mapped, regulated riparian habitat classifications adopted by the 2005 Floodplain and Erosion Hazard Management Ordinance amendment; and provide acreages. f. Existing drainage infrastructure (e.g., culverts, basins). g. Any lakes, ponds, wetlands, springs, or other source(s) of perennial surface water. h. Erosion hazard setbacks, as required by the Floodplain and Erosion Hazard Management Ordinance; also include a description of the methodology used to determine them, and provide the data in an appendix.	Amend the list of hydrological characteristics that must be mapped
Pima County Code 10.56 - Community Participation and Mitigation	Provides an opportunity for public to comment on roadway projects before the course of action has been decided. Ensures mitigation measures for environmentally	10.56.020 - Applicability. A. Major projects. This chapter shall apply to proposed major roadway projects, including environmentally sensitive roadway projects, constructed by Pima County. This chapter shall be a policy statement and guide for proposed major roadway improvement projects and environmentally sensitive roadway projects constructed jointly by Pima County and other agencies or jurisdictions. For purposes of this chapter, the term "major roadway" means a roadway depicted on the Pima County Major Streets and Scenic Routes Plan and which is classified and functions as an arterial roadway. The term "environmentally sensitive roadway" refers to a	Amend the definition of "Major Projects" or alter applicability of 10.56 to Major Projects

Table 4.1. Existing Pima County regulations and protocols that avoid and minimize impacts to scenic, cultural, and wildlife resources.

Pima County Controlling Document	MSCP Rationale	Relevant Sections of Pima County Controlling Document)	Modification(s) that Trigger Notification (Changed Circumstances)
	sensitive areas are addresses for major roadway projects.	transportation project within or crossing environmentally sensitive lands as determined by certain Sonoran Desert Conservation Plan conservation land system categories and/or designation as a Scenic and/or Historic Route, and/or location within or crossing a High or Moderate Archaeological Sensitivity Zone or a Priority Cultural Resource, as described in the Pima County Roadway Design Manual. *(Ord. 2006-31 § 1 (part), 2006; Ord. 1992-69 § 2, 1992)*	
		10.56.030 - General considerations. A. Environmental Effects. Effects of the proposed project on the environment, including but not limited to noise, air quality and wildlife. *(Ord. 2006-31 § 1 (part), 2006; Ord. 1992-69 § 3, 1992)*	Remove the requirement that Environmental Effects be considered for each project.
		10.56.070 - Environmental assessment and mitigation report. B. The environmental assessment and mitigation report shall identify adverse impacts of the proposed project and shall provide recommendations for mitigation measures which may be undertaken to minimize the adverse impacts. The environmental assessment and mitigation report shall contain the information specified in the Pima County Roadway Design Manual. *(Ord. 2006-31 § 1 (part), 2006; Ord. 1992-69 § 4.4, 1992)*	Remove the requirement to identify potential adverse environmental impacts of proposed project and to provide recommendations for mitigation measures that would minimize adverse impacts.
		10.56.240 - Mitigation measures. General and specific impact mitigation measures as approved by the Board of Supervisors as a result of the public hearing on the environmental assessment and mitigation report shall be utilized to mitigate adverse impacts of each major roadway project. Mitigation includes measures to (1) avoid the impact altogether by not taking a certain action or selected elements of a proposed action, (2) minimize impacts by limiting the degree or magnitude of the action and its implementation, (3) rectify the impact by repairing, rehabilitating or restoring the affected environment, (4) reduce or eliminate the impact over time by preservation and maintenance activities during the life of the action, or (5) compensate for the impact by replacing or providing substitute resources or environments. The following mitigation measures shall be implemented for each major roadway project covered by this chapter:*(Ord. 2006-31 § 1 (part), 2006; Ord. 1992-69 § 7.1, 1992)*	Amend the requirement for mitigation to include measures that avoid the impact, minimize the impact, rectify the impact, reduce the impact, or compensate for the impact.

Table 4.1. Existing Pima County regulations and protocols that avoid and minimize impacts to scenic, cultural, and wildlife resources.

Pima County Controlling Document	MSCP Rationale	Relevant Sections of Pima County Controlling Document)	Modification(s) that Trigger Notification (Changed Circumstances)
		10.56.240 - Mitigation measures. A. Environmental. 1. Preservation of Environmentally or Ecologically Sensitive Areas. Where possible, the location of major roadway projects shall avoid areas of significant environmental and ecological sensitivity. Where major roadway projects are adjacent to areas of unique environmental or ecological sensitivity, acquisition in fee simple, acquisition of development rights, or conservation easements may be proposed by the appropriate environmental assessment and mitigation report (see Item 5 below for additional requirements). 2. Landscaping. All medians and right-of-way areas on major roadway projects shall be landscaped with drought-resistant, low pollinating, preferably native plants. Plant species shall be listed as permissible pursuant to the landscaping requirements of the Pima County zoning code. The landscaping theme of each major roadway project shall be compatible with the native landscape through which the roadway passes. Installation of landscaping shall begin no later than six months after the formal completion date of the roadway project. 3. Dust Abatement. Curbs or paved roadway shoulders shall be provided adjacent to through traffic lanes to minimize air borne dust generated by vehicular traffic. 4. Scenic Route Designations. A visual impact analysis shall be included in any environmental assessment and mitigation report prepared for improvements on major roadway projects designated as scenic routes. 5. Environmentally Sensitive Roadways. Roadways are defined as Environmentally Sensitive Roadways (ESR) if they are located within or cross (a) unique ecologically or culturally sensitive lands as determined by the Sonoran Desert Conservation Plan, (b) High or Moderate Archaeological Sensitivity Zones or Priority Cultural Resources, or (c) if the roadways are identified as Historic or Scenic Routes. Projects that are defined as ESR shall be designed and constructed to minimize disturbance to the area resources. Additional environmental resource assessment and mitigation procedures are required as defined in the Pima County Roadway Design Manual.	Amend the list of environmental mitigation measures that are to be implemented for each major roadway project covered by 10.56.

Table 4.1. Existing Pima County regulations and protocols that avoid and minimize impacts to scenic, cultural, and wildlife resources.

Pima County Controlling Document	MSCP Rationale	Relevant Sections of Pima County Controlling Document)	Modification(s) that Trigger Notification (Changed Circumstances)
Chapter 4 - Pima County Department of Transportation Roadway Design Manual, 3rd Edition	The Environmentally Sensitive Roadway Design Guidelines provide roadway design specifications that will minimize or mitigate impacts to environmentally sensitive lands.	Section 4.2 - Environmentally Sensitive Lands and Roadway Designation	Amend the definition of an Environmentally Sensitive Roadway
		Section 4.4 - Biological Resource Process	Amend the process to identify biological resources and evaluate the impacts from proposed roadway projects
		Section 4.7 - Mitigation Tools; Biological Resource Conservation Treatments/Mitigation Options	Modification of treatments/mitigation Options to be considered if impacts to Biological Resources within Environmentally Sensitive Roadway cannot be avoided
		July 6, 2010 Update to Appendix 4D - Step 1. B.	Modify the list of plant species that are to be inventoried within the project area to be disturbed
		July 6, 2010 Update to Appendix 4D - Step 1. C. & D.	Modify the mitigation requirements for trees and saguaros
Standard Detail WWM A-3 in Chapter 9, Gravity Sewer Design Standards, Section 9.1.1.	Minimizes impacts to washes and undisturbed areas due to placement of sewers	Detail No. WWM A-3 and Section 9.1.1. The location of sewers in the following areas/circumstances shall be avoided unless specific approval is obtained from Pima County Wastewater Management on case-by-case basis: 1) across, through and between lots; 2) within or along a wash or wash environment; 3) crossing a wash outside of a road Right of Way; 4) within a common area; 5) within areas undisturbed by development. http://www.pima.gov/wwm/eng/stddet/pdf/wwma3.pdf	Modify part 9.1.1. of the standards, or modify Standard Detail WWM A-3 to eliminate or reduce the avoidance of washes or wash environments or avoidance of areas undisturbed by development.

NOTE: Pima County will notify the USFWS if there are modifications to these regulations and protocols. Section and/or chapter citations may change over time subsequent to document modifications.

4.2 Avoidance and Minimization – Permit Compliance

Potential modifications of the ordinances, guidelines, and protocols (measures) listed in Table 4.1 will trigger Pima County's obligation to consult with the USFWS prior to executing the contemplated modification to ensure that these measures will continue to contribute to impact avoidance and minimization to Covered Species from covered activities as outlined for Section 10 permit issuance. The USFWS will have the opportunity to comment on the potential of the proposed changes to adversely affect specific Section 10 permit provisions that provide for species' protection prior to Pima County's final decision about whether to execute the proposed modification. Pima County will request review and comment by the USFWS on any such proposed modification within 45 calendar days. Should the County move forward with a modification that, in the USFWS's opinion, significantly reduces the effectiveness of the County's avoidance and minimization activities, this may trigger USFWS to identify that a Changed Circumstance has occurred (see Chapter 7).

Above and beyond those avoidance and minimization elements listed in Table 4.1, County departments will also be provided with information on sensitive areas, including, but not limited to, known nesting and roost sites of Covered Species prior to their initiation of construction and maintenance activities. In the case of Covered bat species that may be particularly sensitive to disturbance at roost sites under bridges, Pima County Department of Transportation will be informed of known roost locations in addition to being provided with information on appropriate timing of maintenance activities to avoid disturbance, especially during the breeding season.

4.2.1 Avoidance and Minimization: Indirect Effects

Section 3.8 highlights a number of indirect effects that are likely to result from the Covered Activities. Many of these indirect effects, especially where they occur on privately owned property, are individually and collectively minimized with the County's continuing implementation of conservation measures listed in Table 4.1. On County mitigation lands, minimizing indirect effects will be accomplished through management actions and guidelines, as outlined in Chapter 5.

4.3 Mitigation Tools

Mitigation is the primary mechanism Pima County will employ to address impacts from the Covered Activities. In anticipation of the Section 10 permit, Pima County has been acquiring lands that will be used to mitigate the impacts of Covered Activities (County-controlled mitigation lands; see glossary for complete definition). To set target mitigation requirements, Pima County proposes two complementary accounting tools that replicate the "fine" and "coarse" filter approach that was fundamental to the development of the SDCP. The coarse filter is landscape-focused and provides a program designed to mitigate for impacts to habitat of Covered Species and it also creates benefits for species and ecosystem processes not addressed by the permit. This landscape-level tool makes significant use of the CLS and builds synergy with other County endeavors to implement the SDCP. The second tool is an assessment that Pima County will use to

guide the construction of the mitigation lands network with the objective of providing a quantifiable level of conservation for each of the Covered Species. This fine filter tool employs an acre-for-acre accounting strategy where the intent is to maintain at least one acre of conservation for each acre lost to the Covered Activities.

4.3.1 Land Acquisition in the CLS and Outside of Pima County

Pima County will acquire, protect, manage, and monitor approximately 116,000 acres as mitigation to offset impacts from Covered Activities that occur over the life of the permit (Table 4.2). Applying the landscape-level mitigation tool, mitigation for Covered Activities will be calculated based on the projected acres of impact and its location relative to the CLS. Below are the mitigation ratios that will be used to determine the amount of mitigation acreage required to satisfy the Section 10 permit (acres conserved:acres impacted; see additional details in Appendix B):

- Biological Core Management Area = 5:1;
- Important Riparian Area = 5:1;
- Special Species Management Area = 5:1;
- Multiple Use Management Area = 3:1;
- Agricultural In-holding = 2:1; and
- Outside of the CLS = 2:1.

Assuming that development proceeds at the projected pace and location, MSCP implementation will be phased to provide for appropriate interim milestones: protection of 49,863 acres of land during Permit Phase I; 53,920 acres during Permit Phase II, and 12,538 acres during Permit Phase III (see Table 4.2). A vast majority of these acres will be within the CLS, but mitigation credit will also be claimed for lands outside of the County, which are (by default) outside of the CLS. In some instances where a species-specific mitigation need exists, the County may also secure lands outside the CLS in Pima County. For example, Pima County may elect to acquire non-CLS lands for the benefit of the Pima pineapple cactus.

Based on previous affirmation from the USFWS, Pima County has, over the last several years, been actively acquiring a land portfolio to rely upon as mitigation for impacts resulting from Covered Activities (Table 4.3; Figure 4.1). In this fashion, the County has secured mitigation lands prior to impacts and permit issuance. This arrangement created a financial incentive for the County to acquire land at a lower value and (most importantly) the purchase of large, contiguous blocks of undeveloped land that would likely not be available in the future because of the pace of development in the area.

Taking into account the 25% mitigation credit for State Trust Land agreed to by the USFWS (see section 4.4; U. S. Fish and Wildlife Service 2012), Pima County has already acquired over 110,000 acres with which to mitigate future impacts (see Figure 4.1, see Table 4.3, Appendix H). This represents 95% of the mitigation projected to be

Table 4.2. Acres of mitigation that are anticipated to be needed for Pima County to fulfill the mitigation obligations of the Section 10 permit.

Relationship to CLS	CLS Category	MSCP Mitigation Ratio	Mitigation Needed in Permit Phase			Total Mitigation Needed
			I	II	III	
Inside CLS	Biological Core Management Area	5:1	25,471	16,495	1,892	43,857
	Important Riparian Area	5:1	2,941	3,932	3,799	10,672
	Multiple Use Management Area	3:1	17,000	19,133	1,528	37,661
	Special Species Management Area[a]	5:1	333	557	567	1,456
	Agricultural In-holdings	2:1	0	0	2	2
	CLS Total		45,744	40,118	7,788	93,649
Outside CLS		2:1	4,119	13,802	4,750	22,671
Total (CLS Total + Outside CLS)			49,863	53,920	12,538	116,320

NOTE: Mitigation is based on projected impacts (see Table 3.2) and corresponding MSCP mitigation ratios.
[a] Special Species Management Area acres shown here supersede CLS categories with lower MSCP mitigation ratios, such Multiple Use or Outside CLS.

Table 4.3. Acres of potential mitigation credit that Pima County has already acquired for the Section 10 permit, as it relates to the CLS and State Trust lands.

CLS Location	CLS Category	Fee Title	State Lease	25% Credit for State Lands	Total Mitigation to Date[a]
Inside	Biological Core	32,491	55,991	13,998	46,489
	Important Riparian Area	11,274	2,971	743	12,017
	Special Species Management Area[b]	4,529	28,753	7,188	11,717
	Multiple Use Management Area	25,642	35,991	8,998	34,640
	Agricultural	17	0	0	17
Outside	CLS Totals[c]	73,953	123,706	30,927	104,880
	Outside CLS	906	324	81	987
	Outside of Pima County[d]	1,570	10,915	2,729	4,299
Total (CLS Total + Outside CLS + Outside Pima County)		76,429	134,945	33,736	110,165

NOTE: Mitigation acres are "adjusted" because Pima County will receive at least 25% mitigation credit for State Trust Lands (see Section 4.4). Acreage figures exclude potential mitigation lands that may result from those developments that opt-in to the County's Section 10 permit.
[a] Fee-title acres plus 25% credit for State Trust Lands.
[b] Acres shown here supersede all CLS categories with lower MSCP mitigation ratios, such Multiple Use or Outside CLS.
[c] Because impacts are calculated to a fraction of an acre, there are rounding errors.
[d] Lands outside of Pima County include lands associated with the A7 Ranch (168 acres of fee title lands and 9,630 acres of lease lands), Tortolita Mountain Park (796 acres of fee title lands) and 722 acres of fee title lands that are expected to be acquired from the BLM through the RPPA.

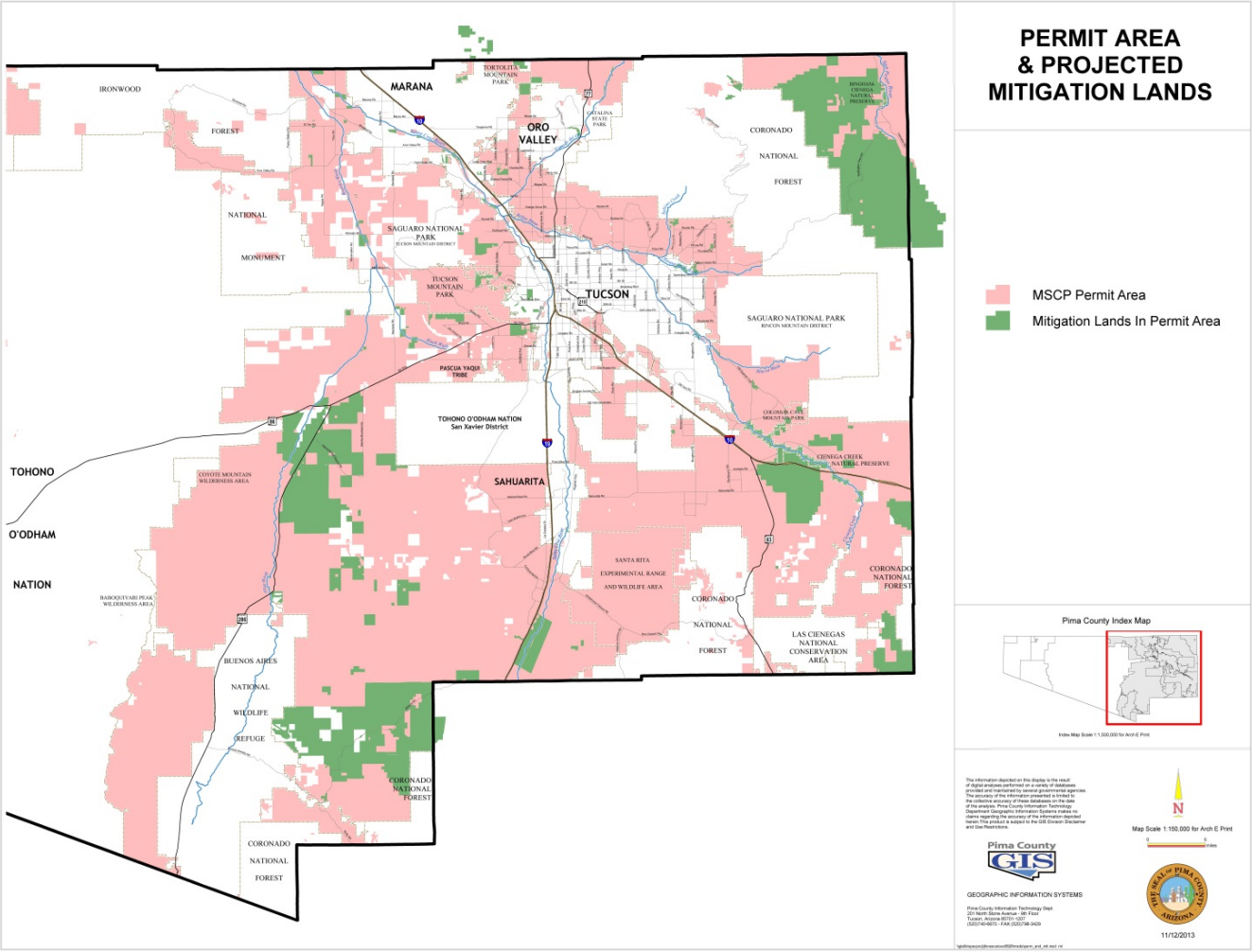

Figure 4.1. Fee and lease land acquired by Pima County for mitigation of activities covered under the Section 10 permit.

NOTE: Includes about 2,000 acres of proposed RPPA patents and near-term donations. Additional mitigation lands are likely to be acquired in the future.

needed over the 30-year permit (see Table 4.2). Based on where impacts are likely to occur relative to the CLS, mitigation will be provided according to the ratios reported in Table 4.2. Based on the current projected footprint of Covered Activities, Pima County's existing land portfolio will be sufficient for all mitigation needs except for those needed to off-set impacts within Multiple Use Management Areas. Because of the lower biological value and mitigation ratio of the Multiple Use Management Areas, Agriculture, and Outside CLS categories, Pima County will—where feasible—seek mitigation acres in higher-value CLS categories (Biological Core, Important Riparian Areas, and Special Species Management Areas).

4.3.2 Ranching and the CLS Mitigation Strategy

Pima County views ranch conservation as the key mechanism to preserve what remains of Pima County's last undeveloped and otherwise unprotected natural landscapes. This conservation approach was endorsed by the SDCP Steering Committee, the STAT, and the Ranch Conservation Technical Advisory Committee (Pima County 2000a). Ranching in its current, low intensity form is consistent with the conservation goals of the MSCP through:

- Landscape and watershed protection by maintaining an unfragmented ecosystem that is largely devoid of roads and other infrastructure;
- Providing connectivity of plant and animal populations across valleys to adjacent, higher elevation areas, thereby providing conservation of areas ranging from valley bottoms to mountain tops;
- Bringing together private, state, and Federal land units into unified, large management units that make management activities more uniform and efficient; and
- More clearly defining the metropolitan and rural interface, which maintains a more compact urban form.

4.3.3 Mitigation Equivalency Analysis for Individual Species

The PCAs and modeled habitat for each Covered Species are not equally distributed across Pima County's proposed mitigation lands. However, mitigation will be appropriately located with respect to habitat such that a minimum equivalency conservation ratio of 1:1 (acres of habitat loss:acres of mitigation) will be achieved. While the number of acres of mitigation needed will be calculated based on the location of impacts relative to the CLS, Pima County performed an analysis of habitat equivalence in support of the MSCP. This analysis suggests that, based on the current set of County-controlled mitigation lands and the agreed upon 25% mitigation credit for managing State Trust lands, Pima County has achieved this ratio for all of the Covered Species (Table 4.4). The equivalency analysis demonstrates Pima County's CLS approach can offset acres impacted by Covered Activities with similar numbers of acres within respective PCAs or modeled habitat. To ensure that CLS mitigation stays ahead of impacts for all Covered Species, Pima County will undertake a species-by-species

analysis of impacts as part of each 10-year program review. The objective is to maintain a minimum of 1:1 mitigation for each Covered Species.

Table 4.4. Habitat mitigation acquired to date for the Covered Species based on the current suite of mitigation lands.

Species[a]	Projected Loss after 30 years (acres)[b]	Fee Title	Pima County Mitigation		Current Mitigation to Anticipated Loss	
			25% Credit for State Land	Total Achieved to Date	Difference (acres)	Ratio (Mitigation:Loss)
Pima pineapple cactus	18,963	9,377	9,945	19,322	359	1
Needle-spined pineapple cactus	852	5,866	2,788	8,654	7,802	10
Huachuca water umbel	364	3,917	171	4,088	3,724	11
Tumamoc globeberry	19,434	13,663	9,361	23,024	3,590	1
Mexican long-tongued bat	5,735	38,554	14,371	52,925	47,190	9
Western red bat	178	18,409	3,032	21,441	21,263	>100
Western yellow bat	48	11,941	1,336	13,276	13,228	>100
Lesser long-nosed bat	15,978	56,565	28,936	85,501	69,523	5
California leaf-nosed bat	111	9,619	2,583	12,202	12,091	>100
Pale Townsend's big-eared bat	1,525	19,097	7,180	26,277	24,752	17
Merriam's mouse	330	8,600	701	9,301	8,971	28
Western burrowing owl	1,392	2,879	0	2,879	1,487	2
Cactus ferruginous pygmy-owl	7,394	29,477	13,771	43,248	35,854	6
Rufous-winged sparrow	19,108	26,298	11,063	37,361	18,253	2
Swainson's hawk	10,981	40,905	15,551	56,457	45,476	5
Yellow-billed cuckoo	28	8,854	1,112	9,966	9,938	>100
Southwestern willow flycatcher	0	409	11	420	420	>100
Abert's towhee	554	10,124	382	10,506	9,952	19
Arizona Bell's vireo	72	7,735	508	8,244	8,172	>100
Longfin dace	0	4,556	312	4,868	4,868	>100
Desert sucker	0	99	0	99	99	>100
Sonora sucker	0	50	0	50	50	>100
Gila chub	0.1	3,434	122	3,556	3,556	>100
Gila topminnow	0.5	4,161	319	4,480	4,480	>100
Chiricahua leopard frog	2	10,175	3,296	13,471	13,469	>100
Lowland leopard frog	7,145	31,239	13,077	44,316	37,171	6
Desert box turtle	748	5,779	20	5,799	5,051	8
Sonoran desert tortoise	9,473	37,059	15,009	52,069	42,596	5
Tucson shovel-nosed snake	63	1,276	0	1,276	1,213	20
Northern Mexican gartersnake	3,210	10,392	464	10,856	7,646	3
Giant spotted whiptail	4,355	10,311	1,460	11,771	7,416	3
Groundsnake (valley form)	11	915	0	915	904	83

NOTE: A mitigation to habitat-loss ratio of >1 indicates that more acres of habitat are expected to be conserved over the 30-year permit period than are projected to be lost to Covered Activities. Mitigation acres listed here do not include: 1) future acquisitions or natural open-space set asides by the private sector and 2) lands outside of Pima County that are owned or leased by the County; these will add additional mitigation acres for most species. PCA and modeled habitat do not currently extend outside of Pima County.

[a] Talussnails were excluded from this analysis because no modeled habitat was expected to be impacted.

[b] See Table 3.3.

4.3.4 Water Rights Acquired on Mitigation Lands

Pima County will acquire groundwater and surface-water rights principally through the acquisition of mitigation lands. Pima County has and will continue to acquire, manage, monitor, and protect water rights and water resources in advance of the need to mitigate for the impact of Covered Activities. The goal of Pima County's water rights management is stated in the Sustainable Action Plan for County Operations, Board Resolution 2007-84, and states the goal of "maximizing County water resource assets, including Groundwater Rights, Surface Water Rights and production and use of effluent/reclaimed water to sustain and protect the County's natural environment."

At present, there are few restrictions regarding the County's future uses of water on mitigation lands, other than those specified in the respective water right(s). Management agreements between Pima County and tenant ranchers restrict the permitted uses of water on County-controlled lands to the amount required to operate the cattle ranching operation on the property, and provide for restrictions of potable use should the water quality fail to meet state standards (Appendix I).

Specific commitments of water or water rights as mitigation under the Section 10 permit will be made in restricted covenants for County-controlled mitigation lands (Appendix J). The covenant will limit the County's future uses of surface water, groundwater and water rights associated with the Mitigation Land. The conservation easement template for private ranch lands (Appendix K) contains similar limitations, which would apply and do apply for those voluntarily granted conservation easements located on private ranch lands. Initially, specific commitments of water rights will be limited to those specified as above, however the County may choose to commit additional water or water rights as mitigation through permit amendments or measures to address changed circumstances.

4.4 Calculating Credit for Mitigation Lands

Pima County proposes an incentive-based approach to gaining mitigation credit from mitigation lands through the implementation of a hierarchical stewardship level program (Table 4.5). Under this program, the amount of mitigation credit on a parcel is adjusted as successive stewardship levels are reached, as established by defined benchmarks or thresholds. Under the proposed framework, varying amounts of mitigation credit would be available depending upon the level of protection, monitoring, and management that Pima County provides on land to be used as Mitigation Land. Pima County will claim partial credit where Mitigation Land is established on 1) State Trust lands leased by Pima County; and 2) natural open-space areas created for compliance with the CLS conservation guidelines as applied by the Board of Supervisors and 3) those created under *Chapter 16.30 – Watercourse and Riparian Habitat Protection and Mitigation Requirements* as applied to Important Riparian Areas. In either of these circumstances, the decision to initiate pursuit of mitigation credit above the baseline percentage of credit will be at the discretion of Pima County.

4.4.1 State Trust Ranch Lands Leased by Pima County

Pima County will receive a minimum of 25% mitigation credit for all State Trust properties held under a grazing lease (see Table 4.5). This credit allocation is based on management of these lease lands to improve resource conditions. These improvements include improved grazing management as outlined in Pima County's Range Management Standards and Guidelines (see Appendix F) and ranch management agreements (see Appendix I). Mitigation credit may increase to 50% on lease lands if certain conditions are met, especially where established condition goals (see Section 4.4.3) are met or exceeded. Full credit (100%) would be possible should the County obtain fee ownership of such lease lands and place them under perpetual protection. If the County loses a grazing lease on State Trust land that is designated as Mitigation Land, the County will be obligated to replace it with other lands that meet or exceed the mitigation credit generated by the lost lease lands.

Table 4.5. Stewardship levels (SL) for the three types of mitigation lands to be used in the Pima County Section 10 permit.

		Ownership Type		
SL	Mitigation Credit (%)	Pima County Fee-title lands	County-leased Lands	Lands within Private Developments
1	25		Hold grazing lease and ensure compliance with terms of management agreement (if any). If grazing lease is held for <30 years, credit is pro-rated.	
2	50		Develop specific and measureable conditions goals AND monitoring data indicate that conditions goals have been met or exceeded	
3	75			CLS-designated natural open space set-aside is legally described and is permanently protected from development via legal instrument separate from plat or development plan. County monitors to ensure that no development occurs.
4	100	Fee title with conservation easement or restrictive covenant, which is conveyed to approved entity, or reversionary clause.	Acquisition of leased lands in fee title with appropriate conservation easements or restrictive covenant. Grazing continues if it is deemed compatible with achieving and maintaining resource condition goals.	For set-asides, Pima County receives rights that allow enhanced conservation and augmented monitoring and management. OR for private ranchland as described in Section 4.5.1.3.

4.4.1.1 Evaluating Changes in Stewardship Level on State Lands

Determining when a parcel or property warrants a change in stewardship level status will be critical to the success of this incentive-based effort. In the case where a State Trust parcel held under lease by the County is elevated from level 1 to 2, Pima County

will employ a defensible and transparent process, one that will be carried out by an independent advisory committee of scientists that will be similar to the STAT committee used to develop the SDCP. Members of this committee will be experts in the appropriate field and they will establish criteria for determining success in coordination with the USFWS; only those geographic areas that met the criteria would be awarded credit. The makeup of the committee as well as the specific condition objectives will be developed in consultation with USFWS staff. The USFWS will need to be satisfied with the process prior to agreeing to grant additional mitigation credit.

Criteria and thresholds for success will vary by the type of project, but will be based on the best available science. Improvements in rangeland conditions will likely focus on a combination of standard rangeland measures (e.g., grass cover) and wildlife habitat measures. Determining success of species enhancement activities will vary depending on the projects, whereby some projects would use the presence or abundance of a Covered Species, while other projects such as wildlife crossings might use a reduction of roadkill as a measure of success. These standards will be developed in coordination with the USFWS.

Parcels and properties that are eligible for upgrading can similarly be downgraded in stewardship status if the independent advisory committee determines that conditions warrant such an action.

4.4.2 Natural Open Space Set-Asides Established to Achieve Compliance with the CLS and the Watercourse and Riparian Habitat Protection and Mitigation Requirements

For those residential subdivisions and non-residential developments that set aside natural open-space areas to achieve compliance with the CLS conservation guidelines or *Chapter 16.30 – Watercourse and Riparian Habitat Protection and Mitigation Requirements* as applied to Important Riparian Areas, and where the project is granted coverage under the Opt-in Provision (as described in Section 3.4.1.1), the County will claim a minimum of 75% mitigation credit of those set aside areas for purposes of the Section 10 permit. However, no Section 10 mitigation credit will be pursued for such natural open space set-asides where the County determines them to be unsuitable to serve as Section10 mitigation lands. When applicable, the 75% credit allocation is based on the commitment that these lands will be protected in perpetuity in a natural condition, thereby providing habitat value and permeability to Covered Species. In addition, Pima County commits to monitoring these set-aside lands at a level that will detect significant encroachment or changes so that remedies can be applied to maintain mitigation values. Should the County receive sufficient rights on these lands that enable the County to enhance conservation and augment monitoring and management activities (e.g., fee-title ownership; legally specified granting of rights allowing additional conservation/monitoring activities), mitigation credit could be increased to 100% pending the County making such a request and the USFWS concurring that increasing the value of mitigation credit is appropriate.

4.4.3 Establishing Mitigation Credit for Species Enhancements

Mitigation credit for fee title, State Trust lands, and land within private developments is relatively straightforward because it is based on an acre-by-acre calculation. More difficult to quantify are those actions that lead to conservation of Covered Species, but where the conservation effect may occur in an area greater than the immediate area of the action. These conservation measures are known as species enhancements. Species enhancements have benefits that are greater or different than their spatial footprint and are typically more expensive to implement. As such, they are typically over and above what is required in HCP management and mitigation. Examples include:

- Construction of wildlife crossing structures to improve connectivity among populations;
- Establishment of additional populations or occupied locations of Covered Species;
- Restoration of special elements, especially riparian and aquatic;
- Non-native species removal and control efforts that are above and beyond those required in the MSCP, as well as efforts that take place outside of mitigation lands; and
- Technology transfer and/or labor to neighboring land owners for Covered Species restoration effort.

Pima County will work with the USFWS to determine, on a case-by-case basis, appropriate mitigation credit for these projects. Pima County and the USFWS will likely seek input from subject matter experts to assist in the evaluation of proposed species' enhancements. In some instances, and for a variety of reasons, species' enhancements may only be temporary. In these cases, species occupancy may be allowed to be taken back to a previously agreed upon baseline condition. Take of species related to a return to baseline is covered under the Section 10 permit. Mitigation credit for such temporary enhancements will be adjusted accordingly.

4.5 Implementation of the Mitigation Program

Mitigation represents the most significant conservation element of the Pima County MSCP; it is intended to secure and maintain sufficient lands to offset impacts associated with Covered Activities in a manner that conforms to the USFWS's criteria. These criteria require that Pima County:

- Possess an ownership or management interest in the mitigation property;
- Exercise legal protection over the mitigation property;

- Manage the mitigation property to retain the biological and species habitat values; and
- Monitor the mitigation property to ensure that biological and species habitat values persist over time.

Mitigation lands will receive full or partial mitigation credit based on the degree to which the above criteria are met. The nature of Pima County's ownership on any given mitigation property pre-determines the tools Pima County will use to meet the remaining criteria. To that end, acquisition of fee-title lands (including appurtenant water rights when possible) and acquisition of partial interests in real property such as leases and receipt of conservation easements are—and will continue to be—the primary conservation tools for assembling Mitigation Lands for the Section 10 permit.

As noted earlier, Pima County has secured a significant down payment on the amount of mitigation anticipated to mitigate the impacts of Covered Activities: approximately 75,000 acres of fee-simple lands and approximately 125,000 acres of lease lands. Pima County intends to obtain additional lands in the future through purchase (i.e., fee simple or acquisition through the RPPA), lease, or receipt of a property right(s). Pima County also intends, when the opportunity exists, to acquire fee title to State Trust land and combine the acquired land with the associated fee-title lands to create contiguous blocks of land ownership.

Potential mitigation lands include properties outside the CLS in adjacent counties where Pima County may acquire land in fee or hold State grazing leases (see footnote in Table 4.3 for more information on these lands). The mitigation credit for these lands will be determined by Pima County at the time when credit is sought, by considering the same factors used in developing the CLS.

4.5.1 Options for Obtaining Mitigation Lands

4.5.1.1 Fee-simple Acquisition

The most direct option for satisfying the County's mitigation needs is for Pima County to obtain lands in fee simple, including the acquisition of associated water and mineral rights, whenever possible. Fee simple maximizes Pima County's control over those activities that will occur on a property and leaves the County as the sole determinant of management and monitoring activities. Although Pima County may acquire fee simple lands anywhere within or in the immediate vicinity of Pima County, the Habitat Protection Priorities of the 2004 Conservation Bond program (and future iterations) guided implementation of the County's land acquisition program. In order to ensure conservation of Covered Species and Special Elements and perpetuate a viable reserve design, acquisitions are most likely to focus on a subset of approximately 525,000 acres of biologically significant parcels of land defined as Habitat Protection Priorities (Appendix L). The RFCD also acquires floodprone lands that may have biological values. To commit acquired lands to MSCP mitigation, the County or District will, for permit mitigation purposes, ensure the long-term conservation of fee simple lands by grant of a conservation easement or restrictive covenant (see Section 4.5.1.2).

Pima County also intends to utilize the RPPA to acquire certain tracts of land currently owned by the BLM. Currently, most County RPPA applications pertain to properties either adjacent to Tucson Mountain Park or near to Tortolita Mountain Park. If Pima County acquires patents from BLM conveying ownership to Pima County, Pima County would commit the use of the undeveloped lands identified on Figure 4.1 to biological conservation under the MSCP. These lands are not part of the BLM's National Landscape Conservation System and have been identified for disposal by BLM. Conservation values of these RPPA-patented lands will be legally protected via a reversionary clause which will revert ownership to the BLM if the lands should ever be used for purposes other than recreational open space. Pima County will claim full credit for protecting, managing and monitoring the identified RPPA-patented lands in accordance with the guidelines of the MSCP.

4.5.1.2 Protection Instruments for Pima County's Fee-simple Lands

Conservation easements, restrictive covenants or other legally enforceable instruments will be used to provide assurances to the USFWS that the biological values of County-owned fee simple mitigation lands will be maintained in perpetuity.

Although throughout this document, Pima County and the RFCD are collectively referred to as the "County", they are actually two separate entities and are co-applicants to the permit. Mitigation land is owned by one entity or the other, not both. Pima County currently owns most of the fee-simple lands that would be subject to protection under this MSCP. To protect fee-owned land in perpetuity, the owner of record may execute and record a restrictive covenant with a third-party beneficiary. An example of this instrument is provided in Appendix J. Alternatively, a reciprocal conservation easement may be executed for long-term protection on these lands, for which either Pima County will be the grantor and the RFCD will be the grantee, or vice versa. For those mitigation lands where Pima County or the RFCD, as the grantor, conveys a conservation easement, a third party beneficiary will be designated and in these situations first preference will be to designate an entity such as the AGFD whose persistence over time is not questionable. This additional layer of protection provides the USFWS with an assurance that biological values on County-owned fee-simple mitigation lands will be maintained over time.

The timing of recordation of these protection instruments will usually be in the year prior to impacts. In this way, Pima County intends to stay ahead of covered impacts. Because acres of impacts—and therefore mitigation requirements—are not known precisely each year, Pima County will complete a full review of the acres and location of Mitigation Land protective instruments at each 10-year review period, or more frequently if this information becomes available. Pima County will be responsible for identifying the appropriate parcels to receive protection and coordinate with the appropriate County and RFCD entities to develop an executable protection instrument for presentation to the Board. Following Board approval, Pima County Real Property will ensure the recordation of the instrument.

Pima County and/or the RFCD may, from time to time, garner MSCP mitigation credit on portions of their fee-owned lands to offset impacts to WUS under Section 404 of the

Clean Water Act, through an In-Lieu Fee or Mitigation Banking program or through permittee-based, project mitigation. MSCP mitigation credit will not be sought on permittee-based project mitigation lands where these lands are providing mitigation for impacts to WUS created by actions of private property owners. The following explains the segregation of—and relationship between—MSCP mitigation credits and credits for mitigating impacts to WUS.

The Corps requires In-Lieu Fee and Mitigation Bank project sites to be protected through an appropriate legal site-protection instrument. The restrictive covenant or conservation easement, once approved by the Corps, would allow for restoration and stewardship of biological values (Appendix M) and would conform to the particular requirements of the 2008 regulations for Compensatory Mitigation For Losses of Aquatic Resources (33 CFR §325 and 332). The restrictive covenant or conservation easement are alternative ways to provide the level of protection sought for lands committed as mitigation under Section 10 of the Endangered Species Act. Land acquisition and restrictive covenants or conservation easements required by the Corps' for mitigating impacts to WUS would be used to substantiate the claim for mitigation value for lands that provide habitat for endangered species under this MSCP. Long-term protection is required before credits are assigned related to the implementation of the MSCP. The Corps-approved site protection instrument provides another means of meeting that requirement. In all cases, the MSCP credits will precede the sale of any credits at the In-Lieu Fee or Mitigation Banking project.

Any mitigation credits related to MSCP implementation will be based on the existing, underlying Covered Species habitat values at that site as reported in the Annual Report using CLS and species values. These MSCP credits are unique and separate from aquatic resource and buffer credits allowed under the Corps' Mitigation Banking or In-Lieu Fee programs. Credits assigned by the Corps are based on aquatic resource and buffer area services and functions that are created or maintained through restoration or enhancement activities. Credits related to the MSCP would be assigned after execution of the Corps site protection instrument and prior to the implementation of on-the-ground restoration or enhancement actions as prescribed by the In-Lieu Fee or Mitigation Banking development plan activities. In this way, credit for both of the MSCP and In-Lieu Fee or Mitigation Banking programs would be separate in kind and in time.

4.5.1.3 Partial Interest: Conservation Easements on Private Ranch Property

Landowner participation in a conservation easement is entirely voluntary, per state statute (Arizona Revised Statutes [ARS] §33-272). Accordingly, Pima County holds conservation easements on several parcels where ranchers chose to retain certain private property rights, generally in the vicinity of the ranch headquarters. Conservation easements of this kind are tailored to the property it covers in order to best conserve on-site resources and meet the seller's needs.

Pima County has developed a conservation easement template (see Appendix K) that is used to guide the development of conservation easements on private ranch land. This template will continue to be used where private ranchers are willing to voluntarily grant the County a conservation easement on their private ranch land. Appendix N is a list of

typical permitted and prohibited actions for use in preparing such conservation easements. Permitted and prohibited activities have been tiered to the type of lands (e.g., habitat protection versus community open space) acquired under the 2004 Conservation Bond Program. In those cases where Pima County intends to purchase a conservation easement on fee-simple lands from another entity, Pima County will do so with fair market compensation for such interest, as determined by a valid appraisal.

4.5.1.4 Partial Interest: State Trust Grazing Leases

Pima County leases land owned by the State of Arizona for grazing purposes. This is one of the most important tools for providing mitigation lands and for maintaining support of the SDCP's ranch conservation element (Pima County 2000e). In such lease situations, the County's fee-simple ranch property anchors the grazing lease and allows the County to manage vast acreages owned in Trust by the State. As a result, these leased lands play an integral role in the County's ability to promote and foster an unfragmented landscape-scale ecosystem which is a critical underpinning of this MSCP.

The lease period for State lands is 10 years with renewal options. A number of situations may arise whereby leases are either lost or land under lease is lost. Reasons for this could include: 1) Pima County terminates the lease, or 2) the Arizona State Land Department does not renew Pima County's lease. In any of these changed circumstances, mitigation credit for those acres will be debited from the total acres of mitigation lands. As necessary to offset the loss of state leases and to comply with its mitigation obligations, Pima County may need to acquire additional mitigation.

4.5.1.5 Life Estates and Other Devices

Pima County may also take advantage of other tools to obtain a controlling interest over lands with valuable conservation assets. These may include—but are not limited to—life estates and reverter clauses or other conditional fee interests. Pima County shall evaluate the appropriateness of using such tools on a case-by-case basis with the primary evaluation criteria being whether such interests assure Pima County that the parcel's conservation values will be protected. Prior to requesting mitigation credit for lands to which one of these legal instruments applies, Pima County will coordinate with the USFWS to evaluate the potential mitigation credit for each acquisition.

4.5.1.6 Donations of Property Interests

Pima County may also choose to accept property interests—ranging from fee simple to partial interest—that are donated by property owners. Pima County shall evaluate such proffered donations for the properties' natural resource values, CLS status, contribution to Pima County MSCP goals, and long-term costs of management and monitoring. Pima County may, at its discretion, request a monetary donation or endowment from the donor to cover management costs. Prior to requesting mitigation credit for lands to which one of these legal instruments applies, Pima County will coordinate with the USFWS to evaluate the potential mitigation credit for each acquisition.

4.5.1.7 Open-space Set Asides Established to Achieve Compliance with the CLS and the Watercourse and Riparian Habitat Protection and Mitigation Requirements

For the purposes of this MSCP, those natural open-space areas created for compliance with the CLS conservation guidelines and those created under *Chapter 16.30 – Watercourse and Riparian Habitat Protection and Mitigation Requirements* as applied only to Important Riparian Areas will, if suitable, be included as mitigation land when the property owner elects to opt-in to the County's Section 10 permit. Responsibilities for protecting the undeveloped, open-space character of the mitigation lands will—unless other suitable arrangements are made—fall to the property owner(s) with oversight and enforcement by Pima County. A legally enforceable instrument separate from the plat or development plan will be required to permanently ensure that such mitigation lands persist in perpetuity and that they remain as undeveloped, natural open space.

4.5.1.8 Fees for Receipt of Coverage under Pima County's Permit

Any fee(s) that a private property owner may be assessed in return for receiving coverage under the County's Section 10 permit will be predicated on the County's authority to assess a "fee for service" as allowed under ARS §11–251.08. Fee structures developed for implementation of this program are subject to authorization of the County Board of Supervisors. One or more fees may be assessed to property owners who seek coverage through the Opt-in Provision. The Opt-in Provision fee structure is comprised of two components: 1) an Application Fee and 2) a Compliance Monitoring Fee. Payment would be a one-time occurrence and is a pre-requisite to receiving permit coverage. For property owners who receive a Certificate of Coverage through the County's issuance of a building permit, no fees are planned to be assessed as they are not required to submit a formal application and are not required to provide natural open space that will be reserved as mitigation.

Coverage provided through the Opt-in Provision requires the successful completion of an application process and an Application Fee will be assessed, as authorized by the Board of Supervisors. This fee is based on the County's investment of resources necessary to review and process the application and to issue Section 10 permit coverage. The Compliance Monitoring Fee will be based on the County's investment of resources necessary to fulfill the long-term obligation to monitor and enforce restrictions on privately owned lands reserved as mitigation. Pending authorization by the Board, a Compliance Monitoring Fee will be assessed only where natural open-space areas created for compliance with the CLS conservation guidelines as applied by the Board of Supervisors or *Chapter 16.30 – Watercourse and Riparian Habitat Protection and Mitigation Requirements* as applied to Important Riparian Areas is suitable to be used as Section 10 mitigation lands. As noted in Chapter 6, monitoring of privately owned Section 10 mitigation lands will not entail on-the-ground activities, but will focus on application of remote sensing data to determine if encroachment or land clearing has taken place.

Current cost estimates indicate that the cost to obtain coverage for any single development that receives coverage via the Opt-in Provision would be no more than $5,000 (in 2013 dollars). Pima County will periodically evaluate the Board-authorized fee structure, including fee amounts, and may seek fee revisions to recover the then-current investment of resources necessary to provide Section 10 permit coverage to privately developed property, in conformance with ARS §11–251.08.

4.6 Regulatory Standards and Relationship to Recovery

Section 10(a)(2)(B) of the ESA identifies Permit Issuance Criteria that must be met before the USFWS can issue a Section 10 permit. Most importantly, the proposed taking cannot appreciably reduce the likelihood of survival and recovery of the species in the wild. Specifically, ESA Section 7 regulations (50 CFR §402.02), define the phrase "jeopardize the continued existence of" as "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species."

4.6.1 Recovery: Mandate vs. Enhancement

One of the issuance criteria for a Section 10 incidental take permit is that the authorized taking will not appreciably reduce the likelihood of survival and recovery of the Covered Species in the wild. The ESA does not explicitly require the Pima County MSCP to recover species or contribute to the objectives identified by adopted recovery plans, and the USFWS must not only consider the extent of impacts to Covered Species and their habitats, but also the extent to which the Pima County MSCP is likely to enhance the habitat of the Covered Species or increase the long-term survivability of the species or their habitat. Mechanisms to address this issue have been built into the MSCP planning process. Mitigation measures outlined in this MSCP will benefit the conservation of listed species in the region. In particular, the mitigation credit structure provides incentives for measures that will contribute toward improvement of habitat conditions and potential for re-establishment of extirpated populations.

4.6.1.1 Recovery Plans and Goals

Some of the Pima County MSCP Covered Species have a Recovery Plan (draft or final):

- Lesser long-nosed bat;
- Southwestern willow flycatcher;
- Gila topminnow; and
- Chiricahua leopard frog.

Recovery Plans for these species have been used as the basis for identifying minimization and mitigation measures for information on appropriate management strategies, and for identifying monitoring needs and protocols. In the absence of other information approved by the USFWS, final or draft Recovery Plans will continue to

constitute the "best available science" for a species. The USFWS has developed a "Recovery Outline" for the jaguar while a full Recovery Plan is being finalized.

4.7 Species Reintroductions

The primary focus of conservation efforts for the Pima County MSCP will be in protecting, improving, and creating habitat for Covered Species. Yet sometimes these efforts are insufficient if a species cannot gain access to the habitat. In these cases, it is often required to facilitate this process using reintroduction techniques. Reintroductions can either be (1) wild-to-wild, where a Covered Species in any life stage is removed from one area and directly introduced into another (usually referred to as translocations); or (2) facilitated, by head-starting or propagating individuals of any life stage that are reared in a captive environment until they reach an age class with higher survivorship and subsequently released into the wild. Either form of reintroduction could be utilized by Pima County.

Species reintroductions of covered animals and plants will be an action under the MSCP. If a species that Pima County is seeking to reintroduce is covered by an existing Safe Harbor agreement, Pima County and the USFWS will determine if it is appropriate to pursue the proposed reintroduction under the existing Safe Harbor agreement. However, Pima County will not be required to use a Safe Harbor agreement approach if it chooses not to.

Each proposed reintroduction effort will follow these general steps:

1) Pima County informs the USFWS and AGFD, in the form of a letter and proposal, about the intent to reintroduce a species. The proposal will include information such as habitat conditions that will help ensure project success, a list of source population(s), proposed monitoring effort, list of personnel and their qualifications (i.e., USFWS permit status) and amount of mitigation credit sought (see Section 4.4.5);

2) If necessary, the USFWS solicits input from other appropriate stakeholders;

3) USFWS provides feedback to Pima County, which can include approval of the project;

4) Once approved, Pima County implements the project (usually with the assistance of the AGFD if the species is vertebrate) and reports back to the USFWS within 1 year of reintroductions; and

5) Monitoring will follow the approach outlined in Appendices N.

Individuals from reintroduced populations may disperse from County-owned or leased lands onto adjacent areas of suitable habitat that are not owned or managed by Pima County. Pima County would not gain mitigation credit for successful natural colonization of these lands. Pima County may issue Certificates of Inclusion, under the MSCP, to neighboring landowners potentially affected by species reintroductions. In which case,

Section 10 coverage for take of Covered Species is granted to these landowners via the Certificate of Inclusion, provided the neighboring landowner meets the following requirements prior to issuance of a Certificate of Inclusion:

- Baseline of species occupancy can be established with permission of the owner via the appropriate type and number of surveys;
- Pima County or some other entity must agree to provide monitoring of occupancy at least every three years;
- Landowners seeking a Certificate of Inclusion must agree to notify Pima County prior to initiating any action that could bring the population back to baseline; and
- Landowners must notify Pima County (or other qualified entity) at least one month prior to such action and allow permission for access and salvage of individuals.

The duration of a Certificates of Inclusion can vary, but cannot continue after the County's Section 10 permit expires.

Pima County will work with its conservation partners (e.g., Arizona-Sonora Desert Museum, University of Arizona, AGFD) to obtain individuals for reintroduction efforts. If Pima County chooses to propagate individuals, it would do so under a Section 10(a)1(A) permit. Any take issues would be addressed under that permit.

4.8 Conservation and Recovery of Aquatic and Riparian Species

4.8.1 Species Enhancement Areas

Pima County will develop a Riparian and Aquatic Species Management Plan within three years after permit issuance. The AGFD and USFWS may assist with this effort, the intent of which will be to contribute to full occupancy of available appropriate habitat within the County's preserve network and other applicable areas by covered fishes, leopard frogs, the Huachuca water umbel, and the Northern Mexican gartersnake. The implementation of this plan will focus on developing, modifying, or affirming appropriate site-specific goals and objectives based on the appropriateness of a site to host specific Covered Species and often to the benefit of other species as well.

The Riparian and Aquatic Species Management Plan will also include ideas for gathering data and/or conserving Covered Species and their habitats on properties close to County owned and leased lands, where such an approach to broader-scale conservation is conducted in cooperation with the respective land owner or land manager, including Tribal interests. Mitigation credit for these conservation actions will be sought by Pima County and the amount of credit will be negotiated with the USFWS on a case-by-case basis.

Pima County will ensure that employees and/or other scientists involved in species re-establishment efforts have the requisite Section 10(a)(1)(A) Recovery Permits,

appropriate State permits, and that activities be coordinated with the AGFD and USFWS.

Within County owned and leased lands, Pima County and its Federal and State partners will designate potential habitat according to its relative importance or appropriateness for reintroductions. Management and maintenance activities could take place at applicable sites, to be known as *Species Enhancement Areas*, which will have three tiers:

Tier I: These are places where existing and/or re-established populations will be managed by Pima County with assurances that all reasonable efforts will be made to ensure that the population contributes to recovery of the species. Those properties where Pima County has sufficient control to guarantee water quantity and quality adequate to support such populations will be eligible for Tier I designation. Examples of these could include the Cienega Creek Natural Preserve and certain Pima County-owned lands at springs.

Tier II. These are sites where Pima County management efforts will provide suitable habitat and improve habitat conditions for existing or re-established populations and at the same time allow permitted maintenance and other Covered Activities. Maintenance, construction, management, or other activities that may decrease habitat values will be preceded by efforts to salvage aquatic vertebrates and other riparian species with the intent of translocating them to nearby suitable locations. Holding of salvaged individuals for translocation is possible. Examples of Tier II areas could include sites such as the Kino Ecosystem Restoration Project at the Ajo Detention Basin, Agua Caliente Park, and Pima County-owned lands along the Santa Cruz River. Species will be returned to the original locations once adequately supportive habitat conditions are established.

Tier III. These are sites where there is suitable habitat for native fish and/or amphibians (though populations are expendable from the perspective of species recovery efforts), but that have the potential to contribute to recovery. Such areas may include ponds on Pima County lands where native fish and frogs are grown for public distribution; and private ponds, including golf course water features, for which landowners request assistance in efforts to replace non-native with native species. Recovery efforts may use sites that are temporary, artificial, heavily managed, and/or impacted. These population re-establishment activities would be conducted with concurrence and appropriate permits, and Pima County may use existing Safe Harbor Agreements (e.g., Chiricahua leopard frog).

In some instances, and for a variety of reasons, species' introductions or translocations may only be temporary. In these cases, species occupancy may be allowed to be taken back to a previously agreed upon baseline condition, but opportunities will be provided to salvage individuals. Take of species related to a return to baseline is covered under the Section 10 permit. Mitigation credit for such temporary enhancements will be adjusted accordingly.

4.9 Additional Implementation Elements

4.9.1 Migratory Birds

The issuance of Pima County's Section 10 permit, in association with the Pima County MSCP, also constitutes a Special Purpose Permit under 50 CFR §21.27 for the take of ESA listed birds in the amount and/or number and subject to the terms and conditions specified herein. Any such take will not be in violation of the Migratory Bird Treaty Act of 1918, as amended (16 United States Code [USC] 703-712). Unlisted birds that are covered by the MSCP are not covered by the Special Purpose Permit and may be taken only if such take is not in violation of the Migratory Bird Treaty Act. This Special Purpose Permit will be obtained through the Migratory Bird Office after an initial 3-year period from the effective date of the Section 10 permit. The Special Purpose Permit will be renewed, provided that Pima County continues to fulfill its obligations under the permit and its associated Implementation Agreement. Each automatic renewal will be valid for the maximum time period allowed by 50 CFR §21.27 or its successor at the time of renewal.

4.9.2 Unlisted Species

Assurances will be given for those species that are adequately covered by the MSCP, pursuant to the HCP Assurances (i.e., No Surprises; [63 FR pages 8859-9973, February 23, 1998, revised 50 CFR §17]) provided the MSCP is being properly implemented. Implicit in this is that 1) the MSCP must address the conservation of the species and its habitat, and 2) all Section 10 issuance criteria specified in the ESA and its implementation regulations must be met. If a species is added to the list of endangered species and that species is not covered under the Section 10 permit, Pima County will work with the USFWS to determine if inclusion onto the permit is warranted (see Chapter 7 for more information). Such an inclusion would require a permit amendment.

4.9.3 Plants in the MSCP and Permit

The Federal take prohibitions under the ESA for listed plants on non-Federal lands are limited, unless taking of those plants is in violation of State law or regulations or in the course of any violation of a State criminal trespass law. However, before the USFWS issues a Section 10 permit, the effects of the permit on listed plants must be analyzed. This is because Section 7 of the ESA requires that any Federal action—in this case issuance of a Section 10 permit—must not jeopardize any listed species, including plants.

The USFWS encourages applicants to consider listed plants in their respective conservation plans and this has been addressed in the County's MSCP as part of the overall ecosystem approach adopted by Pima County and recommended by STAT; four species of plants are proposed for coverage under the Section 10 permit (see Table 3.1). Two of these species are listed as endangered under the ESA. All covered plant species are protected under the Arizona Native Plant Law as "highly safeguarded" (i.e.,

no collection is allowed) or "salvage restricted" (i.e., collection is allowed only with permit.)

4.10 Permit Phasing

Phasing of the Pima County MSCP is necessary to provide a long-term, temporally comparable program to secure mitigation in a manner that parallels the projection of future growth (see Appendix G). This phasing strategy creates benchmarks to monitor the plan's implementation and effectiveness, but it is not the same as permit renewal or a permit amendment. The proposed duration of the permit will be 30 years, which is subdivided into three, 10-year phases. Prior to the end of each Permit Phase, Pima County will initiate an analysis of the biological effectiveness of the conservation and mitigation actions implemented to date under the Permit. This analysis will be subject to peer review.

4.10.1 Permit Phase I: Years 1-10

This permit phase will include the initial "down payment" of mitigation lands on the County's anticipated mitigation requirements. Land and property rights acquired by Pima County since 1999, as previously agreed upon with the USFWS, will be eligible for use as mitigation lands subject to the accrual of impacts from Covered Activities and the corresponding need to mitigate as described in Section 4.4. Lands owned by Pima County prior to 1999, and for which Pima County commits to mitigation (for example, the Cienega Creek Natural Preserve), will be credited towards meeting goals and mitigation requirements based on the evaluation criteria outlined in Section 4.4. Monitoring will be initiated as outlined in Section 6.

4.10.2 Permit Phase II: Years 11-20

During this permit phase, Pima County will pursue additional land acquisition, if necessary. This effort will be informed by the results of the habitat impacts that were reported in Permit Phase I. Ongoing monitoring and adaptive management activities will be implemented and reported.

4.10.3 Permit Phase III: Years 21-30

During this permit phase Pima County will continue to fund MSCP implementation. Pima County will also continue to acquire or otherwise secure mitigation lands at a level necessary to meet or exceed mitigation requirements for the projected growth in the third decade. Lands and property rights acquired by Pima County during previous Permit Phases that have not already been used to meet mitigation requirements will be credited towards meeting the goals and mitigation requirements of Permit Phase III, as appropriate. At the conclusion of the Permit Phase III, Pima County will evaluate the need to extend or renew the incidental take permit, including any adjustments or amendments to the permit or MSCP.

4.11 Amendments

Amendments to the Pima County MSCP may be sought based on the terms of the final Implementation Agreement (see Appendix D). Amendments may be either major or minor, as determined by the Implementation Agreement and suggested below. Minor amendments will be handled administratively. Major amendments generally relate to situations where a significant change is made to a fundamental aspect of the permit, such as an expansion of Covered Activities or adding to the list of Covered Species. Major amendments will require amending the permit and will involve a full public review process. Procedurally, a permit amendment application is treated in the same way as the original permit application. However, documentation required by USFWS in support of a proposed amendment will vary depending on the nature of the amendment and the content of the original Pima County MSCP documents. In general, if the circumstances necessitating the amendment have been addressed in the original documents, then only amendment of the permit itself will be needed. If the amendment involves an action that was not addressed in the original documents, Implementing Agreement, Biological Opinion, or National Environmental Policy Act (NEPA) analysis, these documents may need to be revised or new versions prepared addressing the proposed amendment(s).

Major amendments might include:

- Extension of the Section 10 Permit Area to cover additional incidental take;
- Additional Covered Species;
- Additional Covered Activities; and
- Changes in conservation or mitigation measures for Covered Species as agreed upon by both parties.

5 LAND AND RESOURCE MANAGEMENT

This chapter outlines the ongoing and proposed land and resource management programs and tools that contribute to fulfillment of MSCP goals and objectives. Over time, many of the management activities highlighted in this chapter will be informed by the monitoring and adaptive management program (Chapter 6). Management actions highlighted in this chapter include the set of activities that are currently committed or are anticipated to be used on County-controlled mitigation lands, as well as those that prohibit certain uses on those lands (see Appendix N). In this way, management refers to those activities that take place after the acquisition or lease of specific properties to ensure that the biological values for which they were acquired are being maintained and/or enhanced over time.

In order to assure that the goals of the Pima County MSCP are realized, land and resource management will:

- Work toward long-term viability and sustainability of native ecosystem structure and function and natural processes in the County-controlled mitigation lands;
- Protect biological resources within County-controlled mitigation lands from threats and other disturbance activities, while also accommodating compatible public uses;
- Enhance and restore conservation targets in appropriate locations to improve habitat for Covered Species and other species of interest; and
- Respond to monitoring information in a timely manner and use adaptive management, where and when such an approach is warranted.

To achieve these objectives, Pima County will implement the following management approaches, which directly address those significant threats which Pima County has some ability to control. Approaches will be implemented by the appropriate Pima County department.

5.1 Land Management Approaches and Guidelines for Mitigation Lands

5.1.1 Invasive Species

Invasive species represent an important challenge affecting many Covered Species and their habitats and, therefore, the control and/or removal of select invasive species is a priority activity for ensuring the success of the MSCP. Toward this end, the Pima County Board of Supervisors adopted Resolution 2005-265 which directs the County to address and mitigate for the continuing spread and potential introduction of invasive species by establishing the Pima County Invasive Species Working Group. In compliance with the Board's directive, staff is currently participating in multi-jurisdictional invasive species groups, providing public outreach on invasive species, and

implementing targeted control and eradication of invasive species on County-owned lands. This program will continue to evolve through collaboration with other on-going regional, multi-agency efforts. Elements of the program will be incorporated into all management plans developed by Pima County. Property-specific conservation easements or restricted covenants will only allow the introduction of invasive or non-native species in areas identified therein that have been historically devoted to the growing of such species (Appendices H, J).

The most pressing invasive species management issue in Pima County is buffelgrass and the County's response to this species demonstrates its commitment to invasive species management, in general. Pima County Natural Resources, Parks and Recreation Department is an important partner with the inter-agency Buffelgrass Work Group to coordinate mapping, control, and eradication efforts. In 2008, the group completed a five-year Southern Arizona Buffelgrass Strategic Plan to facilitate buffelgrass management throughout the region (Rogstad 2008). More recently, the County is working with utilities that operate within County-owned rights-of-way to ensure that the utilities address buffelgrass control issues.

5.1.2 Management Guidelines for Riparian Systems

The STAT prioritized protecting existing self-sustaining riparian and aquatic ecosystems over the creation of new or enhanced areas of riparian and aquatic life that depend on continuing inputs of water, energy, and materials. Below are prioritized guidelines adopted by STAT that will be used in management activities related to water:

1. Protect systems that are self-sustaining over those that need continual inputs;
2. Restore or enhance native riparian and aquatic ecosystems by releasing water to restore local aquifer conditions;
3. Sites which augment existing high-quality riparian areas are favored;
4. Enhance the ability of secondary effluent or reclaimed water to support aquatic life;
5. Manage riparian and aquatic ecosystems for native species; and
6. If plantings are to be used:
    - Revegetation is favored in areas where perpetual irrigation will not be needed;
    - Conflicts with other public health and safety objectives (e.g., fire, flood, crime, aircraft safety, and disease) should be minimized before proceeding with these projects; and
    - Native species appropriate to the site must be used.

5.1.3 Restoration and Enhancement

The goals of the MSCP cannot be achieved through protection and mitigation activities alone. This is because past land- and water-use decisions have resulted in the degradation or elimination of significant resources throughout Pima County. In addition, future climate change predictions forecast a hotter, drier environment, which will put further stress on resources key to many Covered Species. Therefore, to achieve MSCP goals and ensure the persistence of many Covered Species in Pima County, ecological restoration is necessary to improve selected site-specific conditions.

5.1.3.1 Riparian and Aquatic Restoration

Riparian and aquatic restoration will focus on repairing degraded riparian areas and aquatic features, both in and out of major drainage systems and by enhancing protection and connectivity of the remaining riparian and aquatic fragments along their tributaries. Towards this end, Pima County has completed a number of riparian restoration projects such as the relocation and removal of houses and other residential uses along upper Canada del Oro Wash, restoration at Bingham Cienega and the Cortaro Mesquite Bosque project. Pima County has also participated in numerous agreements with the Corps, USFWS's Partners for Fish and Wildlife Program, State of Arizona, and others that will have long-term positive effects on aquatic and riparian habitat and watercourse functions. These activities are expected to improve conditions for aquatic and riparian species and, therefore, reduce the need for future listings.

Some riparian restoration projects require a supplemental water source (e.g., effluent and reclaimed water) to re-establish the types of facultative or obligate riparian vegetation plant communities that once occurred on the site. Pima County currently allocates a portion of County-owned effluent to riparian restoration projects. Additional effluent is allocated through the Conservation Effluent Pool whereby up to 10,000 acre-feet of treated effluent water per year are made available for riparian projects from metropolitan area wastewater treatment facilities. Projects having USFWS approval of a Section 10 permit will gain preferential access to the Conservation Effluent Pool.

Riparian projects that would use the Conservation Effluent Pool are not anticipated to be used as mitigation during Permit Phase I. Based on the later success of these projects, Pima County may seek mitigation credits for these projects during Permit Phase II and III. If the project funding is interjurisdictional, then Pima County will work with the USFWS to find an equitable method for dividing those credits.

As mentioned under Covered Activities, Pima County may establish sites for offsetting impacts to functions and services of WUS on portions of Mitigation Lands. The activities on these sites would focus on repairing degraded riparian and aquatic features, while conforming to the Corps requirements for compensatory mitigation. Mitigation fees paid to the In-Lieu Fee or Mitigation Bank sponsor pursuant to the 2008 Corps/Environmental Protection Agency mitigation rule may be used, in part, for stewardship activities such as fencing, erosion treatments, invasive species control and re-establishment of native vegetation. Pima County will not seek to count any Corps mitigation activities that improve the condition of the land as Section 10 mitigation, as indicated in Section 4.4.4. Rather,

Pima County will use the mitigation value of the existing, underlying land to offset impacts of Covered Activities elsewhere in the Permit Area, consistent with MSCP Section 4.3.1.

5.1.3.2 Upland Restoration

Some upland areas on potential mitigation lands are in poor ecological condition as a result of past land-use actions such as improper road construction, overgrazing, fire suppression (in areas of historical fire presence), etc. Problem conditions include erosion, shrub invasion, and presence of invasive species. Upland restoration efforts will focus on halting or reversing the degradation to natural resources. Projects will include road restoration and closures, and preventing soil loss through use of appropriate materials and design and maintenance methods. Though Pima County cannot commit to a comprehensive upland restoration program, site-specific projects have already begun on many areas within potential mitigation lands; Pima County anticipates that these projects will continue during the implementation of the MSCP. Additional mitigation credits may be sought for upland restoration efforts.

5.1.4 Public Access, Trails, and Recreation

Some County-controlled mitigation lands preclude or otherwise limit public access because of the sensitive nature of the resources or underlying property rights asserted by others. However, most properties have some level of recreational access. Recreation on lands leased for grazing by Pima County is primarily regulated by the State of Arizona (through the AGFD and State Land Department) or the BLM. For County-owned mitigation lands, Pima County will seek to minimize impacts from County recreation projects by considering the following measures:

- Conducting biological assessments for all land disturbance projects;
- Locating trails and other infrastructure (overlooks, parking areas, picnic areas) in areas that will cause the least impact to soils, vegetation, and other sensitive environmental elements. Where possible trails will be located along existing dirt roads;
- Providing sufficient signage to clearly identify public access points and appropriate types of allowable activities;
- Erecting barriers (e.g., vegetation, rocks/boulders, or fencing) to protect sensitive areas or to block access for ORVs;
- When possible, use natural materials in the construction and maintenance of trails;
- Providing trail repair/maintenance to correct effects of trail erosion;
- Restoring disturbed areas;
- Minimizing trail widths to reduce impacts to important resources;

- Minimize trail densities to reduce impacts to native biota;
- Providing trail fences or other barriers at strategic locations when protection of sensitive resources is required;
- Prohibiting off-road use of motor vehicles except for law enforcement, preserve management or emergency purposes;
- Limiting recreational uses to activities such as photography, hiking, and hunting and limiting other uses that are incompatible with the values for which the property was acquired; and
- In areas where they are allowed, restricting pets to only being on leash except in open-space properties where the use of dogs for hunting purposes is allowed.

Enforcement of these measures is highlighted in Section 5.3 (below). In general, Pima County will avoid actions that limit access to County-controlled mitigation lands for the recreational purposes of sportsmen lawfully engaged in activities related to the legal taking of fish and game, as authorized by the Arizona Game and Fish Commission. Trapping is prohibited on Pima County lands (ARS §301[D]). In some circumstances, Pima County may work with AGFD to limit the discharge of firearms and archery equipment, which can effectively preclude hunting of big and small game species. The determination as to whether to restrict hunting and fishing on a particular mitigation property will be decided on a case-by-case basis and Pima County recognizes the Arizona Game and Fish Commission's authority over restricting hunting and fishing. Any Park rule changes are initially presented to the Pima County Parks and Recreation Commission in noticed public meetings for approval and then forwarded to the Pima County Board of Supervisors for adoption.

5.1.5 Trash and Illegal Dumping

To prevent littering and dumping of trash on County-controlled mitigation lands and to address trash accumulated there, Pima County will, where staffing and circumstance permit:

- Post signage to prevent littering in trail and road access areas;
- Impose fines for littering and dumping;
- Remove litter and trash on a regular basis;
- Prohibit storage of materials such as hazardous and toxic chemicals, and equipment;
- Keep roads and wildlife corridor undercrossings free of debris, trash and all other obstructions to wildlife movement; and
- Provide additional monitoring and/or enforcement as needed.

Trash is a significant management issue in many of the County-controlled mitigation lands, particularly those lands south of Interstate 10 that are traveled by undocumented immigrants. Though the signage and enforcement activities outlined above will be used in many natural areas, they are unlikely to have an effect on the amount of discarded trash from undocumented migrants. To address this management issue, Pima County regularly organizes multi-day Ranch Cleanups.

5.1.6 Adjacent Management Issues

Many mitigation lands are adjacent to areas of high human use such as housing developments, roads, and some washes; thereby creating management challenges with regard to invasive species, trash, and trespassing. As discussed in Section 4.2.1, measures in the Pima County Code limit the indirect effects associated with human use. These measures are applicable to most occupied areas and not just limited to those private-sector Covered Activities. Where Pima County believes that extra measures are appropriate to address threats particular to specific mitigation lands, Pima County may:

- Disseminate educational information to residents adjacent to these areas to heighten awareness of issues relevant to the particular property (e.g., appropriate plantings, construction, pets, lighting, and fire);
- Install barriers and maintain fencing, where appropriate; and
- Evaluate and recommend to the Board of Supervisors, as appropriate, specific measures to decrease the potential that discretionary land-use requests on properties adjacent to mitigation lands could have on exacerbating issues such as invasive species, free-roaming pets, and trespass lighting.

5.2 Ranchland Management

A critical element of the MSCP is the acquisition and lease of ranchland for mitigation. To date, Pima County has acquired a number of working cattle ranches (Figure 5.1). Pima County intends to maintain livestock and associated grazing agreements from the Arizona State Land Department and the BLM on all or most of these ranches. Even though impacts related to the act of grazing are not being proposed for coverage under the MSCP, Pima County is committing to monitor and manage ranch lands according to a strict set of standards and guidelines (see Appendix F). One exception to the use of standards and guidelines may be at the Empirita Ranch, where the ranch is not currently fenced to allow Pima County to manage the cattle herd according to the guidelines.

Ranches purchased by Pima County are leased to independent operators, who own the cattle, manage day-to-day operations, and are responsible for operational costs under terms of a management agreement (see Appendix I). Management agreements are negotiated with each rancher and lists of prohibited and permitted activities are included in these agreements.

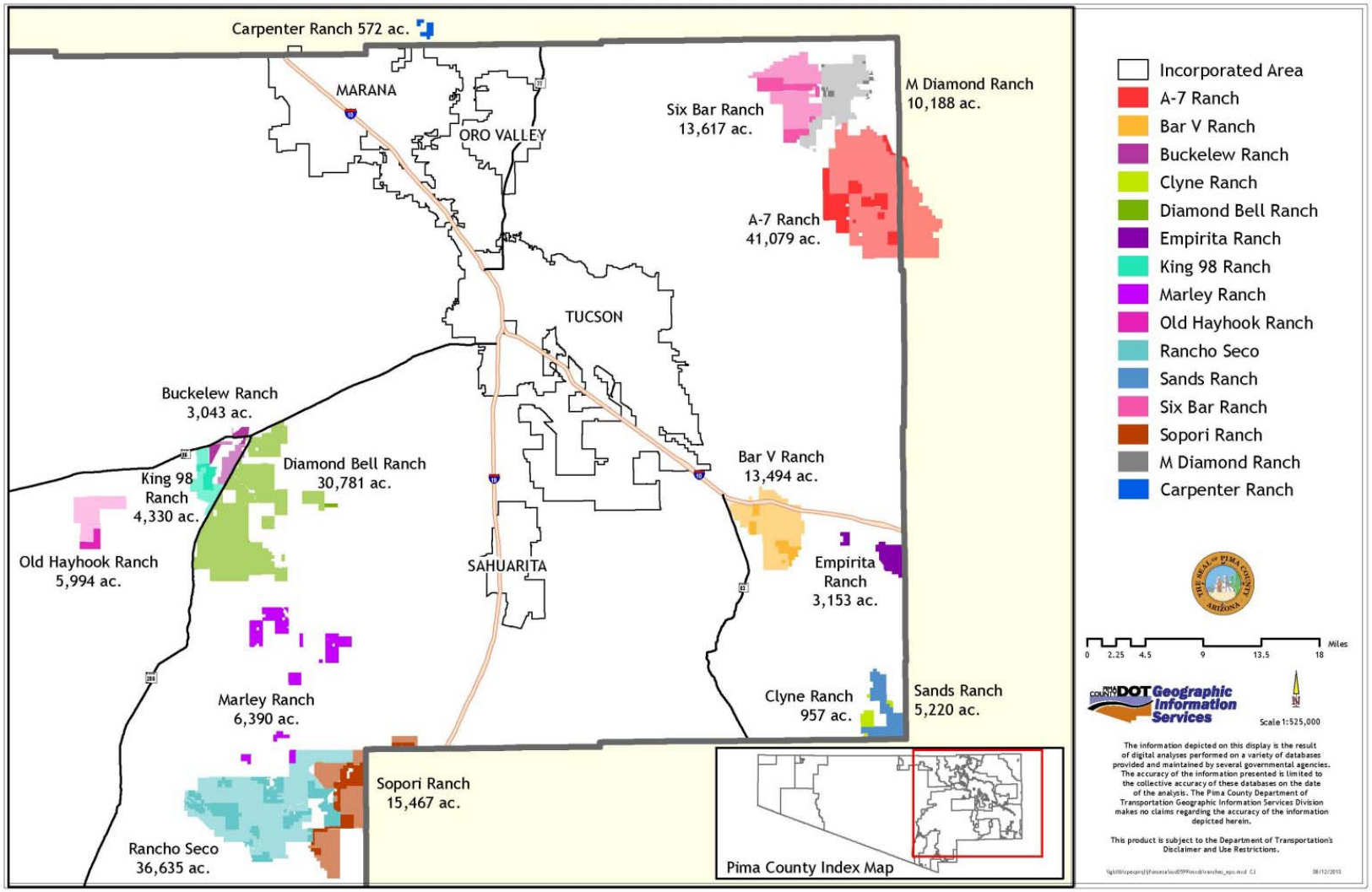

Figure 5.1. Working cattle ranches are a cornerstone of the SDCP and represent the bulk of the lands for which Pima County seeks mitigation for the Section 10 permit.

NOTE: Where applicable, fee-simple lands are a darker shade than associated grazing leases.

Pima County will develop and maintain management plans for each of its ranch properties as time and resources permit, but a management plan will be in place by the time a property is submitted for mitigation credit under this MSCP. In some cases it may be appropriate to develop a single management plan for multiple ranch properties that are in close proximity to each other. Pima County has been using the Natural Resources Conservation Service (NRCS) Coordinated Resource Management Plan process to update or develop plans for ranch properties. To date, four management plans have gone through this process, which includes input from key partners and agencies.

Management plans will include an assessment of rangeland resources (ecological sites, cultural features, etc.), current rangeland conditions, and management goals related to both ranch operations and wildlife. Managers will utilize range monitoring results and results from the Pima County Ecological Monitoring Program (PCEMP) to periodically update and revise management plans. Draft management plans will be available for public review and comment as a part of the planning process. Each management plan will contain the following goals:

- Establish stocking rates, timing, frequency, and duration of grazing that are consistent with utilization guidelines;
- Attain a stable or positive trend in rangeland conditions (vegetative, soils, productivity) over time;
- Utilize grazing systems that will allow for sufficient plant growth, reproduction and residual cover to protect soils from accelerated erosion;
- Adjust stocking rates to account for variation in precipitation and forage production;
- Practice cooperative management and collaboration with ranch operators, other agencies and the public; and
- Maintain public access to and across the ranch properties where public health and safety and negative impacts to wildlife habitat are not an issue.

Pima County manages ranch properties with the intent of achieving sustainable use of natural resources and maintaining functionally healthy conditions for both wildlife and livestock. As a foundation for employing a sustainable ranchland model, Pima County developed standards and guidelines for ranch operations (Pima County 2010) by using techniques developed by the U.S. Department of Agriculture's Agricultural Research Service, NRCS, and BLM. These Standards and Guidelines will be used to monitor rangeland conditions and prescribe management actions and practices necessary to achieve desired future conditions of rangelands. Guidelines include utilization levels of key forage species that will be set at an average level of 40%, the recommended utilization by the NRCS, but lower than current utilization levels on most ranches in southeastern Arizona.

5.3 Land Protection and Enforcement

On County mitigation lands (i.e., collectively, all those lands where Pima County possesses a property interest and that are used for permit mitigation), all environmental ordinances and property-specific rules and terms of legal agreements where applicable, will be enforced and monitored for compliance to ensure that the conservation value of these lands are not being diminished. Illegal activities include but are not limited to illegal ORV use, illegal trash and toxic chemical dumping, human and livestock trespass, harmful law enforcement activities, destruction of infrastructure important for wildlife and their habitat. The Pima County Sheriff's Department provides a special law enforcement unit assigned to police these areas.

5.3.1 Park Rules

Pima County currently maintains a set of rules for its park system, which includes mitigation lands (Pima County Park Rule 4-040; Appendix O). Park rules are essential to the MSCP because they provide enforceable rules for management of various public activities on mitigation lands. Park rules will be updated because of the increase in the extent of the County preserves, particularly since 2004. The new rules will focus on limiting or prohibiting activities that might compromise the basic ecological values of a set of mitigation properties whose primary purposes are to maintain unfragmented habitat for wildlife and as a working landscape. The rules will provide for a greater range in management flexibility, from restricting public access to a property altogether, to regulating recreational activities by the public. The new rules will be similar to those in place on most multiple-use public lands administered by entities such as the USFWS and U.S. Forest Service.

Under ARS §11-931, violation of adopted Pima County rules is considered a Class II misdemeanor, which is punishable by a sentence of up to four months in jail and $750 fine, and is considered fairly strict for many of the types of violations of park rules now being observed. The proposed Park rules to be adopted for County-owned mitigation lands that are designated parks are intended to be consistent with current Pima County Code, but may be more restrictive.

In addition to the Pima County park rules and local ordinances that Pima County will use for property protection and law enforcement purposes, all applicable State and Federal laws (e.g., Clean Water Act, ESA) will be applied. At the state level, the AGFD Title 17 wildlife laws will be enforceable, as would the new State Title 28 vehicle code rules for all-terrain vehicle licensing and use.

5.3.2 Mitigation Lands Owned in Fee by Private Property Owners

Pima County will monitor and enforce restrictions on mitigation lands that are held in fee by private property owners. Pima County will monitor for compliance with legally established restrictions required by Opt-In Provision (see Section 3.4.1.1). Maintaining the integrity and configuration of these privately owned mitigation lands is fundamental to this MSCP. Monitoring for these mitigation lands will employ remote sensing tools to detect encroachments and disturbances. The availability of imagery that can be used for

this application varies, but is typically collected every three years. No on-the-ground monitoring will be carried out. If an encroachment or area of disturbance is found within all or a portion of a designated Mitigation Land, follow-up actions will be taken to remedy the intrusion. Where remedy is not achievable, the compromised acreage will be substituted and replaced to maintain mitigation credit as described in Section 4.4.

5.4 Management Plan Development

Pima County and RFCD will develop site-specific management plans or update existing management plans (e.g., Cooperative Resource Management Plans) for most properties that are greater than or equal to 100 acres. For properties <100 acres, and where it is prudent to do so for larger properties, Pima County may develop management plans that cover more than one property. This approach will be employed where such "complexes" of properties have similar resources, threats, and/or management opportunities. Management plans will only be required for County-controlled mitigation lands or for those properties on which the County has conveyed a conservation easement to another party. Plans will be developed within two years of a property being designated for mitigation purposes. The level of detail for any given management plan will vary by property and will range from plans that address a wide range of resources and activities (e.g., natural and cultural resources, visitor experience) to brief documents that focus only on the natural resources for which the property was acquired. Despite the level of complexity that will be implemented for each property, all management plans will directly address the management activities related to the maintenance of MSCP resources including—but not limited to— avoidance and minimization efforts to ensure protection, species and habitat needs, emerging threats, invasive species removal needs, ordinance enforcement activities, and anticipated future resource needs. If a property was acquired to provide habitat for a particular species or resource, management plans will directly address the specific management actions that will be undertaken to ensure the continued survival and may assist recovery of the Covered Species or maintenance/improvement of the resource condition. Even if a parcel does not have an active management plan, park rules and prohibited and permitted activities will still apply.

As noted, the Natural Resources, Parks, and Recreation department currently employs the Cooperative Resource Management Plan model (see Appendix F). These plans will be updated—as time and resources permit—to include the range of resources that are needed to satisfy the MSCP requirements, as outlined above.

5.5 Cooperative Wildlife Management

The Pima County MSCP was developed, in large part, with the goal of wildlife conservation. Yet, Pima County recognizes that the authority to manage resident wildlife is reserved to the state through the Arizona Game and Fish Commission and migratory wildlife and endangered species through the USFWS. Pima County will work in close consultation with AGFD and USFWS prior to engaging in any species re-introduction efforts. Pima County will ensure that employees and/or other scientists involved in species re-establishment efforts have the requisite Section 10(a)(1)(A) Recovery Permits.

6 MONITORING AND ADAPTIVE MANAGEMENT

A primary focus of the Pima County MSCP is on the acquisition of mitigation lands to create a County preserve network with long-term habitat protection and enhancements for Covered Species. Though land acquisition is a critical piece of the County's conservation program, monitoring and adaptive management of those lands are also important for ensuring that the values for which they were purchased are maintained over time and to assess progress towards determining if MSCP goals are being met. Specifically, the monitoring program must provide information to:

- Evaluate compliance with the terms and conditions of the Pima County MSCP (compliance monitoring);
- Assess the achievement of the biological goals and objectives of the Pima County MSCP (effectiveness monitoring);
- Provide direction for—and assess the success of—management actions (adaptive management); and
- Identify the occurrence of changed and/or unforeseen circumstances, and suggest appropriate management responses.

6.1 Compliance Monitoring

Pima County will provide the USFWS with an annual compliance report (Appendix P) that will contain sufficient information for the USFWS to determine whether the County is fulfilling the requirements of the Section 10 permit, as outlined in the Implementation Agreement (see Appendix D) and this MSCP. Details of the annual compliance monitoring report can be found in Section 9.1.

6.2 Effectiveness Monitoring

The majority of the County's MSCP monitoring effort will be focused on determining the effectiveness of the County's fee-title and leased-lands mitigation efforts at maintaining or improving habitat of Covered Species and their populations and detecting threats that can negatively impact these resources. To this end, Pima County will implement the PCEMP, which is designed to:

- Implement monitoring as described in Appendix Q, including recording and entering incidental observations in the Covered Species Information Database;
- Measure progress toward meeting the biological goal and objectives of the Pima County MSCP, and
- Detect meaningful ecological change(s) and provide information to managers in a timely manner to ameliorate or mitigate for adverse effects.

The PCEMP will include five programmatic elements for monitoring: species, habitat, landscape pattern, threats, and climate. This chapter provides a brief introduction to each element and the parameters (sometimes referred to as "indicators") associated with each. The chapter provides a summary of each program element and associated commitments and principles (e.g., data management), but more details about the PCEMP are provided in Appendix Q.

6.2.1 Species Monitoring

Species-level monitoring is a key element of the PCEMP and Pima County will commit to monitor population parameters for 15 species (Table 6.1), which were chosen to represent a mix of taxa, habitats, and degree of spatial distribution; from species with very small distributions in Pima County to species with widespread distributions. The goal of species monitoring will be to detect biologically meaningful changes to these populations, particularly declining populations. Table 6.1 provides summary information about the monitoring effort and Appendix Q provides in-depth information about the protocol to be used, survey effort, and where monitoring will take place. In the early years of the monitoring program there will be considerable attention put toward development of species-specific protocols. For most species, protocol development will include existing USFWS-adopted protocols that have been modified to the County's temporal and spatial sampling strategy.

Table 6.1. Summary of the single-species monitoring effort for the Pima County MSCP.

Species	Parameter	Survey Effort	Timing of Implementation (relative to permit issuance)	Notes
Pima pineapple cactus	Abundance/ occupancy	Minimum of 10 sites surveyed every 3 years	Preliminary protocol provided to USFWS within 18 months of permit issuance.	Work with USFWS to develop acceptable protocol
Huachuca water umbel	Occupancy	2 areas every 3 years	Preliminary protocol provided to USFWS within 24 months	Restoration efforts will be monitored
Lesser long-nosed bat	Abundance or index to abundance	At least 1 site every year	Protocol is established; survey work will begin with 12 months of permit issuance.	Monitoring will take place at roost sites and may occur outside of County preserves if the County does not find a roost site on preserve lands
Mexican long-tongued bat, California leaf-nosed bat, Pale Townsend's big-eared bat	Abundance/ occupancy and site condition	At least 10 sites every 3 years	Preliminary protocol provided to USFWS within 24 months of permit issuance.	Monitoring will include restoration sites
Cactus ferruginous pygmy-owl	Occupancy	At least 10 sites every 3 years	Habitat mapping and preliminary protocol provided to USFWS within 24 months of permit issuance.	Protocol may need revisiting to make surveys efficient
Southwestern willow flycatcher	Presence	3 sites every 3 years	Protocol is established; survey work will begin with 12 months	

Table 6.1. Summary of the single-species monitoring effort for the Pima County MSCP.

Species	Parameter	Survey Effort	Timing of Implementation (relative to permit issuance)	Notes
Yellow-billed cuckoo	Abundance/ occupancy	3 transects every 3 years	Protocol is established; survey work will begin 12 months of permit issuance	
Gila chub, Gila topminnow, and longfin dace	Relative abundance/ occupancy	Every 2 years at Buehman Canyon and Cienega Creek		Pima County will rely on current monitoring effort at Cienega Creek Preserve. If that effort stops, Pima County will assume responsibility.
Lowland leopard frog	Occupancy	At least 6 sites every 3 years	Initial survey within 24 months; protocol within 30 months	
Chiricahua leopard frog	Occupancy	Restoration areas: each for 3 years after reintroduction	Protocol within 18 months of permit issuance	No populations currently exist on County preserves
Sonoran desert tortoise	Occupancy	15 sites every 3 years	Initial survey within 24 months; protocol within 30 months	

6.2.2 Habitat Monitoring

Habitat monitoring is a key component of the PCEMP and reflects the understanding that changes in key habitat features can parallel changes in species abundance and distribution. Determining what constitutes habitat and how to monitor it was a two-year planning process, and is detailed by Steidl et al. (2010) and summarized in Appendix Q. In brief, the design process considered a host of potential environmental features (i.e., habitat features used by many different species) and compared environmental features based on different objectives that focused on issues of management, importance of Covered Species relative to other species considered in the planning process, etc. Some environmental features emerged as the most important to monitor regardless of the weighting scheme used. Most notably, vegetation characteristics were among the most important because of their importance as habitat to many of the vertebrates included in the planning process. In fact, of the top 12 Environmental Features, 10 are related to vegetation. Not surprisingly, water was another critical feature that emerged and together, these two groups of parameters will form the foundation of the habitat-based monitoring effort for the PCEMP. Though not part of the design process, caves, mines, and adits will also be a part of habitat monitoring for the PCEMP. Below is a brief summary of the habitat elements of the PCEMP.

6.2.3 Vegetation

Two aspects of vegetation were consistently chosen in the design process: 1) *structure* is the physical formation, arrangement, and physiognomy of vegetation and is often measured as density or volume of vegetation; and 2) *composition* refers to the plant species present on a site and includes measures of stem density, abundance, or frequency. The objective of the vegetation monitoring portion of the PCEMP will be to

detect biologically meaningful changes to vegetation parameters within the County's preserve network and which contribute to the health and survival of the Covered Species. Vegetation monitoring will be resource-intensive, but the results can be directly related back to multiple Covered Species. This landscape-level effort is being implemented to address multiple Covered Species and evaluate the effectiveness of the MSCP.

Vegetation monitoring will involve establishing a network of long-term monitoring plots (a minimum of 100 plots) at which detailed vegetation measurements will be taken (see Appendix Q for details). Pima County is also investigating the use of aerial LiDAR to monitor vegetation structure across large portions of the preserve network. Pima County will commit to monitoring vegetation plots regardless of the outcome of the LiDAR effort unless the USFWS agrees that the results from the LiDAR surpass those of the ground-based data collected at long-term monitoring plots.

Vegetation monitoring will also continue as part of the County's annual ranch management activities. This vegetation monitoring is officially outside the scope of the MSCP monitoring, but data from this effort will inform the adaptive management of ranches and contributes to the County's ability to receive 25% mitigation credit on State lease lands. These monitoring results will be included in Pima County's annual MSCP report.

6.2.3.1 Water Resources

Water plays a key role in most ecological patterns and processes, especially in arid environments. In riparian areas, water availability determines the extent, composition, and structure of the vegetation community and has profound effects on biodiversity in general. Because of its importance, Pima County will commit to monitoring four water resources: 1) seeps and springs, 2) shallow groundwater in select systems, 3) perennial streams, and 4) water quality. Details of the water resources and where they will be monitored can be found in Appendix Q.

6.2.3.2 Caves, Mines, and Adits

Caves, mines, and adits are key habitat resources for most of the bat species covered under the Section 10 permit, as well as for many other wildlife species. Pima County will commit to monitoring at least 10 caves, mines, or adits that are home to bats on County preserves. The location and exact number of caves, mines, and adits included in the monitoring program will be determined after the County completes an inventory of possible sites following permit issuance. Initial site visits will entail a detailed survey of conditions including size and dimensions, recent evidence of vandalism, and any structural issues that may cause deterioration of the cave or preclude subsequent visits, as well as a determination about the potential for installing bat-friendly gating. Management actions to reduce threats to the mine and help ensure long-term stability of the resources will be made on a case-by-case basis and as resources permit.

6.2.4 Landscape Pattern

As its name implies, landscape pattern takes a broader view than does the single-species monitoring or habitat monitoring; it includes land-cover type, land use and a variety of derived parameters such as fragmentation and roads. This approach is anticipatory in that many of these features are among the best leading indicators of change. Analysis of landscape pattern will focus on detecting short-term change in land uses or land-use intensities, land ownership, preserve status, and the extent and configuration of County roads and sewers. At intervals determined by the availability of appropriate products (most notably the National Land Cover Dataset) Pima County will analyze changes in land cover across the entire County or portions of the County for which data is available. In addition to the National Land Cover Dataset, the County will use other remotely sensed products, especially multi-spectral, high resolution satellite imagery, as they are made available to enumerate finer-scale changes in land-cover types throughout the County. The cost of obtaining these products for large areas (e.g., eastern Pima County) is beyond the capability of the PCEMP to undertake; therefore, the PCEMP will rely on other entities such as the Pima Association of Governments to spearhead acquisition of remotely sensed imagery. The high-resolution data collected by the Pima Association of Governments will also be used to validate whether the open-space set asides within private development (for which Pima County is claiming mitigation credit) remain in a natural and undisturbed state.

6.2.5 Threats

Like landscape pattern, threats monitoring can be similarly broad and anticipatory and can have some overlap with landscape pattern for parameters such as land use and road networks. Yet the primary focus of threats monitoring will be on-the-ground activities at County preserve lands. Staff will collect data associated with the extent and severity of: ORV use, invasive species, groundwater pumping, vandalism and littering, and toxic chemical spills. Pima County will report changes in these parameters at intervals appropriate to the data being collected.

6.2.6 Climate Monitoring

Climate is a primary driver of natural processes and therefore will play an important role in the PCEMP. Fortunately, many other governmental entities have extensive climate monitoring stations and Pima County will use these data, including those from: Arizona Automated Local Evaluation in Real Time Network, Arizona Meteorological Network, National Weather Service Cooperative Observer Program, Colorado River Basin Forecast Center, Citizen Weather Observer Program, Remote Automated Weather Station Network, and others. Because of the high spatial variability of precipitation in this region, Pima County will install precipitation gauges at select sites in County preserves that would provide adequate spatial coverage. Data will be reported to the Service every 12-24 months depending on the site.

6.3 Program Duration and Phasing

Prior to permit issuance, Pima County will continue program planning activities, but (with a few exceptions) compliance and ecological monitoring will start after permit issuance. The PCEMP will be fully implemented (i.e., all program elements will monitored at least once) within five years and implementation will be in three planning phases. Within one year of permit issuance the County will enact an implementation plan to guide program development through the end of Planning and Implementation Phase III. The reason for the phasing, rather than starting all program elements and parameters at once, is to: 1) complete inventories of Covered Species and habitat resources, the location of which is essential to determine before the County finalizes the selection of monitoring sites; and 2) allow for field testing of protocol and optimization of spatial and temporal sampling designs to ensure that the program is as efficient as possible before finalizing the long-term monitoring protocols. In this way, each planning phase builds on the success and lessons learned from the previous phase(s).

6.3.1 Planning and Implementation Phase I: Permit Years 1-2

Planning Phase I will take place within two years of permit issuance. The primary programmatic activities in Phase I will include:

- Inventory of County preserves to locate features that might not already be known about the properties and that are directly related to the presence of Covered Species and their habitat. Features include the presence of Covered Species themselves; caves, mines and adits; riparian vegetation; and presence of water. Threats will also be recorded. This information, combined with that already collected on the properties, will provide a good baseline of information that will assist in the avoidance of impacts to habitat features used by Covered Species;

- Single-species monitoring. The first year of survey effort for each species will be devoted to protocol development, field testing the protocols, selection of monitoring sites, and subsequent revision of monitoring approach, if needed. Other activities will include development of the programs' database; and

- Field visit protocol, including standard operating procedures for all field crews to follow when conducting field work. Data collected will include: (1) information about the area and time visited; (2) incidental observations of select species; (3) observation of a list of invasive species (approximately 15-20) that all field crews will be required to know and record if seen; and (4) evidence of recent disturbance such as trash or ORV use.

6.3.2 Planning and Implementation Phase II: Permit Year 3

Monitoring activities in Phase II will involve continuing many of the activities from Phase I (except inventories) and include the following activities:

- Further refine field protocol for vegetation, soils and ground-cover monitoring at long-term ecological sites. Continue to develop and field test the protocol (see

Appendix Q). Full implementation on all plots will take place during Phase III and beyond.

Water resource monitoring at:

- Seeps and springs, which will involve periodic assessments of flow at select springs and seeps on County preserves, and
- Perennial and intermittent creek flow, which will involve wet/dry mapping at select creeks (Youtcy, Buehman, Espiritu) at least once per year. Quarterly wet/dry mapping at Cienega Creek will continue.

Threats monitoring will include protocol development for:

- County data related to the built environment (e.g., extent and location of the built environment) and the extent and location of some future development based on Comprehensive Plan Amendments, rezoning, etc.;
- Changes in land-cover type, as products such as the National Land Cover Dataset and Southwestern ReGAP become available; and
- Field-based protocol for collecting information on ORV traffic in ecologically sensitive areas, invasive species, etc.

Other activities during Planning Phase II will include: development and implementing a field safety plan and working with interested citizens and citizen groups to determine appropriate projects for their involvement.

6.3.3 Planning and Implementation Monitoring Phase III: Permit Years 4-5

Phase III will be completed within five years of permit issuance. Activities in Planning Phase III will include continuation of elements from Phases I and II, which will be finalized during Phase III. New program activities will be:

- Development and implementation of the climate monitoring protocol, which will focus on precipitation monitoring at select long-term habitat monitoring sites, and
- Finalizing the program's data management and communications plans.

6.4 Location of Monitoring Activities

Most on-the-ground monitoring will be on County Preserves greater than 100 acres in size, though monitoring will take place on smaller properties if a specific resource (e.g., springs) exist there (see Appendix Q for a map of properties included). County Preserves include properties owned and leased by Pima County, some of which are not being used for Section 10 mitigation (e.g., Tucson Mountain Park). Additional monitoring sites may be located where an agency, organization, or individual agrees to allow

monitoring on their respective lands. Mitigation lands that are privately owned will not be used for on-the-ground ecological monitoring. Instead, remote sensing tools (e.g., aerial photographs and satellite imagery) will ensure that those lands are being conserved in keeping with requirements of the Opt-In Provision. Finally, monitoring for the landscape pattern element will employ remote sensing data that is collected for large areas of land, including areas outside of County preserves.

6.5 Data Management

Robust data management principles, practices, and procedures will be a cornerstone of the PCEMP and the draft data management plan provides a strategy to ensure that all PCEMP data are well documented, secure, accessible, and useful for the life of the permit and beyond (see Appendix Q for more information). As part of the data management enterprise, the PCEMP will distribute natural resource monitoring information to make data available to a wide community of users, including County staff, other researchers and scientists, and the public.

Pima County will also work with the City of Tucson and Town of Marana HCP programs to share data management tools and results to both leverage resources and provide communication among these entities, though Pima County envisions being the central data repository of all scientific data for the Pima County MSCP. Pima County will ensure data security, compliance with industry standards (Information Technology Infrastructure Library), and provision of guidance with respect to standards for data submitted by participants.

6.5.1 Covered Species Information Database

Monitoring activities will form the foundation of the program and will be used to determine permit compliance and effectiveness. Yet the program will benefit from the fact that Tucson is a regional center for ecological research and monitoring activities, much of which could contribute to an understanding of the distribution and abundance of Covered Species. To provide an effective means of collecting and summarizing this information, Pima County will develop the Covered Species Information Database. Pima County will periodically query researchers, governmental entities, and non-governmental organizations regarding any data collected on Covered Species. Information sought will include reports, sightings, or emergence of new threats. If deemed appropriate and if acceptable to the entity contributing the data, information from these sources will be part of the annual report to the USFWS. Participating researchers and government and non-governmental entities would be encouraged to participate through public outreach activities, but the program would be on a voluntary basis. These data will be available to other HCP efforts in the region.

6.6 Adaptive Management

It has been a guiding principle throughout the SDCP process that sound stewardship of natural resources requires that managers base their decisions on the best available information (Pima County 2001a). The PCEMP is being designed to monitor a range of resources (species, habitat, ecosystem, threats, climate), which may will impact

Covered Species. As these resources change over time, management actions may need to address or correct observed trends (particularly negatively trends) in Covered Species and/or their habitats. In the design process for the program, the parameters included in the habitat monitoring element were chosen, in part, on the ability of management actions to address negative trends in these resources (Steidl et al. 2010). The evaluation of management actions using monitoring data and subsequently informing future management actions is known as *adaptive management*. Adaptive management is an iterative learning process that identifies gaps in understanding, facilitates action, and modifies management based on new information (Walters 1986). Pima County will employ two types of adaptive management: 1) those decisions for which a single management action is needed (responsive management actions) and 2) decisions that require recurrent actions (recurrent decisions). Each is discussed below.

6.6.1 Responsive Management Actions

Responsive management actions take place in situations where there is little or no uncertainty about the causes of observed resource change or where there is only a single management action to pursue, such as the purchase of additional lands or a specific treatment of non-native species. Responsive management actions can also include those opportunities where some uncertainty exists about the course of action to take, but where it may be impractical or prohibitive to undertake a research effort to determine the best course of action. Responsive management actions will most likely be applied to many changed circumstances outlined in Chapter 7 and/or where it is determined that the avoidance, minimization, and mitigation measures outlined in this MSCP are not achieving their desired outcomes. Management actions in this context are typically one-time decisions affecting activities or policies on County preserves and include such actions as:

- Revisions to internal protocols and standard operating procedures that improve avoidance and minimization practices;
- Amendments to—or additional—Pima County Code requirements that improve avoidance and minimization practices contingent upon approval by the Board of Supervisors;
- Adjustments to the land acquisition program;
- Revisions to regulatory programs applicable to County-owned mitigation lands;
- Removal of non-native species or other threat; and
- Restoration activities.

Monitoring will play an integral part in responsive management actions because the outcome of these types of on-the-ground management activities and new acquisitions will be integrated into the PCEMP as they relate to Covered Species and their habitats. As such, monitoring data from these efforts provide an extraordinary opportunity for learning and for determining the success of management actions. This integrated

framework will provide managers in Pima County and elsewhere with an unprecedented opportunity to evaluate data that have direct application to assessing program progress towards meeting the SDCP and MSCP goals.

Beyond the more structured learning process outlined above, there will be many opportunities during the permit to learn from management actions that are more unintentional because monitoring sites will be impacted by both stochastic (e.g., floods and wildland fire) and planned events. These quasi-experiments can provide an opportunity to compare impacted sites with those not experiencing impacts (Green 1979). Though not formally a responsive management action, these events will provide extraordinary learning opportunity because of the extensive spatial and temporal scope of the PCEMP.

6.6.2 Recurrent Management Actions

The second type of adaptive management will be those situations where monitoring data contribute to management actions that are repeated over time. We term these *recurrent management actions* and applications include those situations where an on-the-ground management effort is repeated at a regular interval (e.g., annually). In the Pima County MSCP, the most significant use of recurrent management decisions will be in regards to the ranch management program, specifically cattle stocking-rates and its relation to improving resource conditions over an established baseline. Recurrent management decisions could also be employed in situations where species reintroductions take place in multiple iterations, whereby monitoring data will inform both the success of reintroduction efforts and potential alternatives to meet program goals. For example, by monitoring parameters in addition to the species themselves, it may be determined that reintroduction efforts should be undertaken within a specific range of environmental conditions.

6.7 Adaptive Monitoring: Changed Circumstances and New Methods

An objective of the PCEMP is to provide timely information to managers. To enable this feedback process, it is essential that the program be broad in scope, flexible in design, and responsive to unforeseen management issues and threats as they arise. These changed and unforeseen circumstances (see Chapter 7) will inform changes to existing monitoring protocols, as well as the potential to implement entirely new protocols to address them. Many changes to the monitoring program will be carried out in coordination with the USFWS and subject-matter experts. An evaluation of the need for additional funding will be included in any assessment of changed circumstances. Changes to a monitoring protocol will not need an amendment to the permit.

In addition to changed circumstances, it is inevitable that, during the course of the 30-year permit period, new and better monitoring tools and analytical methods will be developed. Therefore, Pima County will notify the USFWS of any emerging technologies or methods that might have direct application to the PCEMP. If a new technology or method is adopted by the program, Pima County will provide a report on the technical issues, most importantly how to crosswalk legacy data (i.e., data already

collected) with a new data collection protocol or analytical technique. This will ensure consistency of results and ensure that legacy data are properly incorporated into the new protocol. These reports will be part of the annual reports to be provided to the USFWS.

The final type of change that may be needed is the possible discontinuation of a monitoring protocol if the information being received is not meeting expectations. Discontinuation of protocols is common in ecological monitoring programs because of labor/equipment cost increases, or more commonly because the level of sampling required to detect a meaningful trend is greater than was originally budgeted. Because cost and sampling design issues are being considered in the design of the PCEMP, Pima County does not anticipate that significant changes will occur. Nevertheless, it may be necessary. Prior to discontinuation of a protocol, Pima County will convene a review by subject-matter experts to determine if the existing protocol can be modified to meet budgetary constraints and changed detection goals. Changes to protocols or discontinuation of protocols will be carried out in consultation with the local USFWS representative and species experts.

6.8 PCEMP Oversight

Input and support from the public and scientific communities was key to the successful implementation of the SDCP. Pima County will continue to employ input from the public and scientific communities as part of PCEMP implementation. Specifically, Pima County will engage three groups for their input: County staff, external peer reviewers, and local stakeholders. These groups will evaluate different facets of the PCEMP to help ensure scientific credibility, feasibility, and efficient implementation into management actions. Roles and processes are described in Chapter 9.

6.9 Monitoring Partnerships

One of the key lessons learned from regional-scale conservation planning efforts elsewhere in the U.S. is the importance of cooperation and coordination among relevant entities. Ultimately, the success of the PCEMP will hinge, in part, upon the application of the best scientific and management principles that are shared by all the major land owners and managers of the region. The most likely partners early in the program's implementation will be the National Park Service's Sonoran Desert Network Inventory and Monitoring Program and BLM's Las Cienegas National Conservation Area, the Town of Marana, City of Tucson, Pima Association of Governments, AGFD, and the USFWS, as well as many other entities.

7 CHANGED CIRCUMSTANCES, UNFORESEEN CIRCUMSTANCES, NO SURPRISES, AND OTHER FEDERAL COMMITMENTS

Section 10 regulations [50 CFR §17.22(b)(2)(iii)] require that a conservation plan specify the procedures to be used for dealing with changed and unforeseen circumstances that may arise during the implementation of the HCP. In addition, the HCP Assurances (No Surprises) Rule defines "changed circumstances" and "unforeseen circumstances," and describes the obligation of an HCP permittee and the USFWS.

7.1 Introduction

Pima County will make every effort to implement avoidance, minimization, and mitigation measures (conservation measures) necessary to conserve the Covered Species and their habitats. In addition, the management of mitigation lands, the 10-year initial permit evaluation, and the flexible provisions regarding the expenditure of mitigation funds provided by Pima County are intended to meet and address future exigencies and emergency situations. Thus, the Pima County MSCP is well situated to reduce the potential for adverse changed or unforeseen circumstances on the Covered Species and their habitats. Notwithstanding the provisions of the Pima County MSCP, if adverse changes or unforeseen circumstances result in, or threaten, a substantial change in the population of any Covered Species or the overall quality of any habitat of that species, as determined pursuant to the procedure outlined herein, Pima County and USFWS will cooperate to resolve the adverse impacts that result in take in accordance with this section. For the purposes of this MSCP the terms "changed circumstances" and "unforeseen circumstances" are defined in the HCP Assurances (No Surprises) Rule.

7.2 Changed Circumstances

Changed circumstances are "changes in circumstances affecting a species or geographic area covered by an HCP that can reasonably be anticipated by Plan developers and the [USFWS] and that can be planned for (e.g., the listing of a new species, or a fire or other natural catastrophic event in areas prone to such events)" (50 CFR §17.3). Table 7.1 lists identifiable changed circumstances and Pima County's potential responses.

Table 7.1. Changed circumstances for the Pima County Section 10 permit.

Category	Circumstance/Scenario	Potential Impact on Covered Species and/or their Habitat	Potential Response(s)
Involuntary loss of State Trust grazing leases designated as mitigation	County loses ability to hold state grazing leases that have been identified as mitigation. Loss is reported in annual report to the USFWS	New lessees might manage or use the land differently, or restrict access for management and monitoring. Species and/or habitat may be negatively impacted.	Loss of leased land may result in the loss of mitigation credit. If the mitigation credit is needed to offset mitigation impacts which have already occurred, the lost CLS mitigation value will be replaced in full through commitment of additional CLS lands on a schedule that is approved by USFWS. If practicable, the replacement lands will be identified and committed prior to actual loss of the lease.
Climate Change	Climate change affects a host of resources and processes, including water availability, precipitation events, etc.	Declines in habitat quality and extent for species that are dependent on riparian forest structure and aquatic habitat. Periodic elimination of non-native or native fish, potentially other covered aquatic vertebrates.	Section 7.2.1 describes ways in which Pima County addresses climate change.
	Increased warming increases the length of the growing season. More annual growth in plants when sufficient water exists.	Shifts in plant community composition and distribution that could indirectly affect Covered Species.	See Section 7.2.1. No management response, but monitoring rainfall will be a priority for the PCEMP.
Habitat Improvement	Central Arizona Project recharge creates aquatic habitat, and expands riparian habitat.	Improved habitat for riparian and aquatic Covered Species; potential for providing habitat for invasive aquatic species.	No action, however Pima County will remain available to assist tribal governments and other entities in developing projects or programs consistent with the Pima County MSCP.
	Due to the efforts of The Nature Conservancy and discontinued mining downstream, Lower San Pedro River becomes better watered.	Some aquatic species benefit, but it is possible for longfin dace and lowland leopard frog to decline due to improved habitat conditions for invasive species. Riparian, forest-dependent Covered Species benefit.	Coordinate with The Nature Conservancy and others on land management and acquisition opportunities. Conduct invasive species management.
Habitat Loss/Degradation: Development	Land is graded on County-held grazing leases, County conservation easements, or County-owned mitigation lands for infrastructure or other developments beyond County's control (e.g., condemnation)	Loss of habitat and fragmentation of landscape, reducing viability of some Covered Species populations.	Verify that loss has occurred; if so, replace with lands elsewhere in the CLS according to acres of impacts and MSCP mitigation ratios of the condemned lands, if mitigation credit is needed. Replacement will be on a schedule that is approved by USFWS. Attach conservation easements to new mitigation lands. Seek mitigation from those causing the damage.
	Conversion of desert, riparian areas, or grasslands to agriculture in Permit Area or on adjacent tribal lands.	Loss of habitat and fragmentation of landscape, reducing viability of some Covered Species populations.	No action; Pima County has no regulatory authority over agricultural land use. However Pima County will continue to offer support and assistance to Tribal governments and other landowners in developing their own conservation programs that are consistent with the Pima County MSCP.

Table 7.1. Changed circumstances for the Pima County Section 10 permit.

Category	Circumstance/Scenario	Potential Impact on Covered Species and/or their Habitat	Potential Response(s)
	Conversion of desert, riparian, or grasslands to development due to Federal projects or federally authorized projects of others in the Permit area or on adjacent tribal lands	Loss of habitat and fragmentation of landscape, reducing viability of some Covered Species populations.	No action; Pima County has no regulatory authority over Federal actions. However Pima County will apply the appropriate mitigation guidelines for impacts within the CLS.
	Mitigation lands are compromised and can no longer be used for mitigation. Lands could include condemnation for a utility right-of-way, or unauthorized impacts within privately owned Mitigation Land	Loss of habitat and permeability (connectivity).	Pima County will first attempt to rectify the cause or source of the changed circumstance. If the source or cause of the problem is not identifiable or if the County determines that the remedy is not feasible or practicable, Pima County will substitute these acres with land that has a CLS value that meets or exceeds that of the compromised Mitigation Land, as necessary, to maintain the appropriate ratio of Mitigation Land to lands impacted by Covered Activities. When such circumstances are encountered, the County will coordinate a resolution with the USFWS on whether it is retained or replaced as mitigation.
	New unplanned foot trails adversely affect Covered Species.	More disturbances of roosting and nesting of Covered Species. Spread of invasive species.	Consider systematic monitoring; Incorporate requirements for mapping, removal, and restoration of wildcat trails in conservation easements and/or Management Plans (See 5.4 and 5.1.4); Ensure approved trails will have limited, designated access points (Sec. 5.1.4).
Habitat Loss/Degradation: ORVs	Loss or degradation from increased ORV use in existing and proposed mitigation land.	Degradation of existing and potential habitat or lethal take of terrestrial Covered Species.	Pursue increasing enforcement; road restoration efforts; consideration for designated ORV areas to be established. Existing laws ban ORVs from public washes and riverbeds.
Habitat Loss/Degradation: Roads	Construction of expanded international port-of-entry and highway improvements in Altar Valley.	Increase in lethal take, particularly along State Routes 286 and 86; increased risk of influx of invasive species; potential adverse effect on cactus ferruginous pygmy-owl, Desert box turtle, and Pima pineapple cactus.	Support State and Federal agencies in efforts to minimize impacts and monitor conditions, especially for Covered Species. Propose tools for reducing impacts (e.g., wildlife underpasses and fencing).
	Interstate 10 bypass placed in Avra Valley	Additional incidental take and fragmentation of Covered Species habitat, especially Tucson shovel-nosed snake, groundsnake, Sonoran desert tortoise, western burrowing owl, and cactus ferruginous pygmy-owl.	Discuss with Arizona Department of Transportation alternative routes or ways to minimize and mitigate damage, suggest incorporating appropriate wildlife crossing structures in the design phase of the project.

Table 7.1. Changed circumstances for the Pima County Section 10 permit.

Category	Circumstance/Scenario	Potential Impact on Covered Species and/or their Habitat	Potential Response(s)
	New roads or utilities established in CLS outside Preserves.	Potential for Covered Species to be affected.	Solicit legally enforceable protections for occupied habitat; target additional areas for mitigation by utilities or road builders.
	Paved road over Redington Pass.	Likely significant increase in vehicular traffic, ORV use, habitat destruction and fragmentation, roadkill, and spread of invasive species.	Such paving is not a Covered Activity. Pima County has already purchased many of the developable lands, and has targeted additional developable lands in the San Pedro Valley.
	Paving San Pedro River Road from Pomerene to San Manuel	Loss of Huachuca water umbel habitat at Bingham Cienega; more development in San Pedro basin, resulting in fragmented Covered Species habitat.	Monitor conditions at Bingham Cienega; comment on proposals, solicit avoidance, minimization and mitigation.
Habitat Loss/Degradation: Vegetation	Severe freezes lead to widespread mesquite or ironwood die back and incidence of bacterial necrosis in saguaros increases.	Minor effects to cactus ferruginous pygmy-owl nesting sites. Minor loss of foraging habitat for lesser long-nosed bat.	Landscape-scale reserve design covers broad areas, not all of which would be affected equally at any given time. Continue with acquisition program that is focused on securing diversity of vegetation communities.
	Reduction in effluent discharge from County treatment facility (below permit issuance baseline) contributes to die-offs of riparian forest and elimination of aquatic vegetation along the Santa Cruz River in Pima County.	Increase in burrobush, decrease in aquatic habitat area. Riparian forest-dependent and aquatic Covered Species decline.	Determine what impacts to Covered Species have occurred. Evaluate strategies to reverse or minimize impacts to Covered Species. Engage effluent owners in minimization or mitigation strategies. Consider allocations of alternative water sources to the river, including the Conservation Effluent Pool.
	Elimination of natural, restored or created wetlands, cienega and cienega-like environments due to social conflict or public perception (airport restrictions; mosquito, other vector and aesthetic preference issues).	Destruction of existing wetlands may affect one or more Covered Species and their habitat(s).	Social threats to natural wetlands and cienegas will be assessed to determine possible interventions; County will consider creating or expanding wetlands elsewhere to offset the loss of any wetlands so affected on MSCP mitigation lands. County will advise AZGFD and USFWS of translocation opportunities for Covered Species.
	Desiccation of other groundwater-dependent riparian systems.	Habitat quality and quantity for Covered Species associated with riparian forest will decline. Mesquite bosques and broadleaved deciduous trees will be more stressed, and fewer recruitment events will occur. Habitat quality and quantity for Covered Species aquatic species will decline.	Seek to acquire important aquatic areas and water rights; Participate in multi-jurisdiction efforts to increase water conservation and public education; Asses site-specific circumstances for possible interventions; evaluate effectiveness of monitoring. Consider allocations of alternative water sources, including Conservation Effluent Pool.

Table 7.1. Changed circumstances for the Pima County Section 10 permit.

Category	Circumstance/Scenario	Potential Impact on Covered Species and/or their Habitat	Potential Response(s)
	Increase in desiccation of Lower Cienega Creek by groundwater pumping by residential and commercial development in the Vail, Empirita, and Mescal areas, below permit baseline	Shift to less aquatic habitat, more strand vegetation over time. Mesquite bosques and broadleaved deciduous trees will be more stressed, and fewer recruitment events will occur. Habitat quality and quantity for aquatic and riparian Covered Species will decline.	Coordinated and concerted effort to work with landowners and developers in minimizing pumping and its impacts; purchase riparian habitat and/or water rights (ongoing); long-term potential for treating and reusing wastewater for landscape irrigation and support of natural systems.
	Arrival of fire ants (*Solenopsis invicta*) into riparian areas	Potential impact on lowland and Chiricahua leopard frogs, northern Mexican gartersnake, and giant spotted whiptail lizard.	Fire ant reports should be conveyed immediately to the Arizona Department of Agriculture, with whom a response should be coordinated. Immediate response may prevent establishment. Consider enhanced monitoring effort.
	Establishment of feral pigs, sheep, or goats in additional conserved riparian areas (outside of the San Pedro River).	Potentially problematic for riparian and aquatic Covered Species.	Establish a program under which feral pigs, sheep, and goats are removed from County preserves. Include removal actions in all Conservation Easements and/or management plans developed for Conserved Lands.
	Invasion by exotic species or species-specific disease that threaten Covered Species or their habitats which cannot be effectively controlled by currently available methods or technologies or which cannot be effectively controlled without resulting in greater harm to other Covered Species.	Reduction in abundance, distribution or habitat quality for Covered Species. Impacts to species and their habitats are unlikely to be restricted to Pima County properties.	Consult with species experts and the USFWS to create a response strategy.
	Invasive aquatic species (e.g., bullfrog, crayfish, non-native fish) enter Cienega Creek or other aquatic sites from non-Central Arizona Project sources.	Bullfrogs: negative effect on aquatic Covered Species. Crayfish: negative effect on aquatic Covered Species. Mosquitofish (*Gambusia*): adverse effects upon Gila topminnow and would be difficult to remove. Sunfish could affect Gila topminnow, Gila chub, and northern Mexican gartersnake. Effects greater if the fish get into Upper Cienega watershed as opposed to Lower Cienega.	Work to eradicate invasive species at select sites. Identify and manage problematic stock ponds on County-controlled mitigation lands. Support crayfish restrictions on commerce; public education, encourage fish management by AGFD, develop interagency contingency plans. Seek voluntary restriction on distribution of *Gambusia* for mosquito control.

Table 7.1. Changed circumstances for the Pima County Section 10 permit.

Category	Circumstance/Scenario	Potential Impact on Covered Species and/or their Habitat	Potential Response(s)
	New species of landscaping plants are discovered to be invasive into wildland settings, affecting habitat of Covered Species.	Effects on Covered Species is not possible to forecast.	Seek revisions to Pima County approved plant lists and recommend new species be added to the State of Arizona list of noxious weeds. Develop protocols to restrict commercial distribution of landscaping species found to be invasive. Removal of invasive plants and follow-up monitoring.
	Utilization of Central Arizona Project water introduces new non-native aquatic species to Santa Cruz watershed.	Harm could be great to covered native aquatic vertebrates and their habitat. New species could include quagga mussel (*Dreissena rostriformis bugensis*), zebra mussel, (*Dreissena polymorpha*), New Zealand mudsnail (*Potamopyrgus antipodarum*), and *Salvinia*.	Identify likelihood of harm to Pima County populations of Covered Species. Work with Federal partners; seek voluntary restrictions on untreated Central Arizona Project discharge to watercourses.
Listed Species	Future listing of a Covered Species that was not listed at the time permit was originally issued	None	USFWS automatically authorizes incidental take of such newly listed Covered Species as prescribed by regulation (63 FR 35, pages 8859-8873, February 23, 1998).
Listed Species	Natural establishment of Yuma clapper rail (*Rallis longirostris yumanensis*), least tern (*Sturnula antillarum*), or other currently listed species that is not considered for Section 10 permit coverage.	Could have direct or indirect impacts on Covered Species, through predation, competition, or habitat modifications.	Evaluate necessity of amending permit to add species to the permit and whether any additional measures are needed by Pima County. If found on County lands, surveys, management, and additional monitoring actions would be established when new species are added to the County's permit (see Section 7.5). The nature and extent of these actions would be negotiated with the USFWS at the time of permit amendment.
Introduced Native Species	Native species (e.g., beaver or prairie dog) introduced or re-established, which reduce the abundance, distribution or habitat for Covered Species within the Permit Area.	Direct or indirect impacts on Covered Species, such as predation, competition, or habitat modification may result	Report any relevant post-project monitoring information to USFWS and AGFD. Confer with those agencies regarding any steps that can be taken to reduce observed impacts on Covered Species.
Listing Change	Delisting of Covered Species.	None	A delisted species would be considered a covered, unlisted species and Pima County would continue to implement any associated species-specific conservations strategies.
	New designation of critical habitat for Covered Species.	None	As a non-Federal entity, no further action by Pima County is needed. The MSCP has adequately addressed habitat for Covered Species.

Table 7.1. Changed circumstances for the Pima County Section 10 permit.

Category	Circumstance/Scenario	Potential Impact on Covered Species and/or their Habitat	Potential Response(s)
	Designation of critical habitat for species that are not covered under the permit	NA	Pima County will assess the importance of critical habitat on a species-by-species basis and may choose to amend the permit to cover the species if take of the species is anticipated. As a non-Federal entity, no specific action is required to address effects to critical habitat. If there is a Federal nexus for a Covered Activity, Section 7 consultation may be needed.
Monitoring	Changes in monitoring protocols are proposed to STAT or other technical group because of failures to detect trends, high cost or inefficiencies in the current design.	No direct change, but negative trends in populations, habitats, or increases in threats that are not detected by the program may preclude intervention activities. Changing protocols may increase precision of estimates and increase the cost of the monitoring effort	Any changes will be made with the approval of the local USFWS office and species expert.
Mining	Copper or other mining begins at Rosemont, Davidson Canyon, Buehman Canyon, or other watersheds.	Potential contamination of streams with heavy metals, and watershed diversions or habitat losses. Potential effects upon Covered Species located in the direct impact areas or upon downstream aquatic Covered Species. Increased saltcedar along watercourses laden with salts.	Support the USFS or other agencies in their efforts to develop permit requirements to avoid or minimize potential adverse impacts. Seek anti-degradation provisions from State, and mineral withdrawals from Federal government, if authorized by the County Board. Compliance with all monitoring, permit amendments and closure requirements are the main activities that can be taken afterwards.
	New limestone quarries established in various areas outside County preserves.	Could affect needle-spined pineapple cactus and, potentially, certain bat roosts.	Seek additional limestone lands as part of the County-controlled mitigation lands. Board may choose to direct staff to take additional action.
	Major expansion of existing mines	Loss of habitat for Covered Species	Pima County will encourage authorities to mitigate consistent with SDCP policies & guidelines.
Mitigation land inadequacy	The acreage of Covered Impacts exceeds available mitigation land credits and Pima County offers no additional mitigation credit to meet the obligation	Impacts remain uncompensated according to the CLS formula	The USFWS, the Pima County Board of Supervisors, and the public will be notified. Permit coverage for the unmitigated balance of development will be suspended. No additional ESA protection for Covered Activities will be available until the deficiency is rectified. If mitigation deficiency cannot be rectified, USFWS may suspend or revoke the permit.
Change in County authority due to state action	State legislative or judicial action could diminish the County's authority to comply with the terms of the permit	Limiting the County's authority to perform avoidance, minimization, or mitigation measures could impact some species or their habitats	USFWS would be notified of the adverse effect expected upon species or their habitats; Pima County would attempt to devise alternate means of preventing the adverse effect: and USFWS and Pima County will determine whether a permit amendment is warranted.

Table 7.1. Changed circumstances for the Pima County Section 10 permit.

Category	Circumstance/Scenario	Potential Impact on Covered Species and/or their Habitat	Potential Response(s)
Change in County regulations	Pima County revises regulations or policies listed in Table 4.1	Changes of avoidance and minimization measures may impact some species or their habitats. No harm if proposed changes provide equal or greater protection for Covered Species and their habitats.	See Section 4.2.
Permit Area Change	Pima County loses State trust lands grazing leases or right to operate as a result of voluntary or involuntary actions by the County	Stewardship might change and more impacts are apparent	Pima County will replace with fee-simple or leased land elsewhere to maintain the appropriate balance of mitigation credits, if needed.
	Federal land is conveyed to private sector	Stewardship might change and more impacts might ensue	No action required by Pima County, however the County may wish to seek a permit amendment to cover private development if the released land is not in the permit area.
	State land is conveyed to private sector in Permit Area	Stewardship might change and more impacts might ensue	Covered activities will be eligible for inclusion as discussed in Section 3.4.
Population change	Loss of a known population of Covered Species within Pima County.	Effects are species-dependent. Tucson shovel-nosed snake may be extirpated from Pima County.	Where appropriate, Pima County will participate in reestablishment of species on committed lands, in coordination and collaboration with USFWS and AGFD.
	Immigration of Covered Species into County-controlled mitigation lands or elsewhere in the Permit Area.	Increase in population(s) of Covered Species.	This is a desirable outcome.
	Precipitous population decline in other species outside Pima County	Viability of species' continued existence declines.	Encourage USFWS and AGFD to include Pima County in regional surveys; review County monitoring data for evidence of decline.
Taxonomic Change	New genetic information reclassifies species	No physical effect on Covered Species, but legal status may change.	No change if the species is split into two or more species or subspecies, other than acknowledging the taxonomic change in the appropriate annual report. If the species is subsumed into another species with a larger geographic distribution, then Pima County may elect to amend the permit.
Toxic spill	Toxic or hazardous waste spill into Cienega Creek or the Santa Cruz River either from the railroad or from the interstate highway.	Potential adverse effect on Covered Species native fish and frogs, including kill-off; loss of vegetation within Important Riparian Area.	Render assistance to responding agencies; seek post-spill remedies from the responsible parties and through regulating agencies.
Wildlife/Plant disease	Pathogens affect Covered Species or key habitat feature of Covered Species	Reduced abundance or distribution of Covered Species; potential reduction of habitat quality	Discuss appropriate course of action with subject-matter experts; consider whether any management changes are needed on County lands.

Table 7.1. Changed circumstances for the Pima County Section 10 permit.

Category	Circumstance/Scenario	Potential Impact on Covered Species and/or their Habitat	Potential Response(s)
Wildland Fire	Wildland fire exceeding 1,000 acres in size occur inside or outside the County preserve network. Not all County preserves are affected at the same time, but at least one is.	Direct mortality of Covered Species. Enhanced erosion and siltation. Fire may open up the forested environments on mountains possibly harming some species. In lower elevations, potential loss or alteration of habitat for most Covered Species. The result of wildland fires may benefit Covered Species such as the Swainson's hawk. May be instrumental in improving watershed condition over the long term.	Determine whether the fire will improve long-term conditions. Participate in cross-jurisdictional fire evaluation and management actions. Continue to protect lands that span different mountain ranges and watersheds. Rest mitigation lands from grazing if severely burned to facilitate recovery and forage production.

7.2.1 Changed Circumstances: Climate Change

Climate change is a considerable threat to the biota of Pima County and beyond (Powell 2010) and, therefore, warrants special analysis regarding the Section 10 permit. During the twentieth century, the earth's surface warmed by an average of 0.74 degrees Celcius (IPCC 2007), a trend that appeared to be even more severe in the southwestern U.S. (Lenart and Crawford 2007). Climate models for the twenty-first century show an acceleration of temperature increases and more severe and prolonged drought in the southwestern U.S. (Christensen et. al. 2007; Seager et. al. 2007). In Pima County, precipitation is expected to become more variable and with reduced winter precipitation. Because temperature and precipitation influence the abundance and distribution of biota and impact ecosystem processes, climate change impacts will be far-reaching and unprecedented (Parmesan 2006).

Modeled impacts of climate change on biodiversity, in particular, predict extraordinary change; by one estimate 15-37% of the earth's species may go extinct by 2050 as a result of climate change (Thomas et. al. 2004). Not surprisingly, the potential for extinction is greatest for those species that are already at risk, such as many of Pima County's Covered Species. Climate-driven impacts on ecosystem structure and function (e.g., fire, nutrient cycling, and succession), coupled with non-climate related threats (e.g., Covered Activities, ORV use, mining, and pollution), will impact Covered Species and their habitats in Pima County in ways that are difficult to predict. Indeed, no comprehensive assessment has been undertaken to determine vulnerabilities of species in Arizona to climate change, though efforts are now underway, including for some Covered Species.

Even with species assessments, considerable uncertainty will remain as to the severity and timing of impacts. Rather than wait for these uncertainties to be resolved, Pima County has taken a number of steps to plan for and mitigate the effects of climate change and increase the resilience of the natural systems to respond to climate-induced changes. Under the direction of STAT, Pima County applied key principles of

conservation biology as they relate to the likely challenges to species in the face of climate change, including connectivity and heterogeneity of natural landscape features. In response to the threat of climate change, Pima County has voluntarily taken action to adapt to or mitigate for the effects of climate change on species and their habitats through:

- Land-use planning practices that seek to reduce the footprint of transportation and infrastructure projects that would contribute to climate-changing greenhouse gas emissions;
- Acquisition and long-term retention of natural open space, some of which would be otherwise developed during the permit period. In their natural, vegetated state, these areas act as a carbon sink relative to developed areas;
- Acquisition priorities that are geographically diverse and biased toward acquisition of riparian habitat;
- Diversity in latitude and elevation of land acquisitions that expand existing reserves or assist in retaining ecosystem connectivity;
- Infrastructure spending to make vehicle transportation more efficient and at the same time provide opportunities for alternative modes of transportation such as busing, biking, and walking;
- Adoption of Sustainability Initiative that supports sustainable development; green building design; use of effluent to sustain river flow and riparian and aquatic resources; and the pursuit of alternative energy sources;
- Identification of ecological refugia (riparian areas, talus, limestone) as conservation targets;
- Sponsorship of NRCS drought assistance to achieve temporary reductions in stocking rates on ranches not owned or managed by Pima County;
- Modifications of stock-watering systems to provide safer and more lasting access to water for wildlife; and
- Buffelgrass management in County preserves and along County roadways.

Pima County believes that these and future MSCP-related planning and on-the-ground efforts will contribute to: 1) a greater reduction in the emissions of greenhouse gases than would take place if the MSCP is not implemented, 2) carbon storage in natural and restored environments, and 3) hands-on efforts to assist the persistence of at-risk species from climate change. Planning efforts to mitigate for the effects of climate change on Covered Species will also take place in coordination with the local scientific community. Pursuant to the advice of the STAT, Pima County will evaluate, at 10-year periods, adequacy of ongoing activities to observed changes in ecosystem conditions,

and examine whether these or other measures might be more effective in maintaining ecosystem structure and function.

7.2.2 Management response to Changed Circumstances

Pima County believes that the proposed management and monitoring measures to be funded by Pima County will be effective to conserve the Covered Species and their habitats within the mitigation lands. However, conditions within the Permit Area, the status of Covered Species' habitat, and the population status of individual species will change over time (i.e., are changed circumstances). The proposed monitoring program will be important to determine the effectiveness of the proposed conservation measures and to determine if additional management actions are necessary. If additional actions are warranted, an adaptive management or responsive management action framework (See Chapter 6 and Table 7.1 for more information) will be used to address the changed circumstances. For potential responses above and beyond those listed in Table 7.1, Pima County will work with the USFWS to choose the best approach for dealing with the Changed Circumstance, at the discretion of Pima County and in consultation with the USFWS.

In addition to the specific potential responses identified in Table 7.1, Pima County and the appropriate State and Federal agencies, along with input from the academic community, may develop an expedited analysis to determine the appropriate management responses for the conservation target (e.g., species, habitats, or key areas). If specific management strategies have been developed previously for such targets or circumstances, those strategies would be reviewed in light of the changed circumstances. Development of management and monitoring protocols for the targets or circumstances would be a priority where such protocols do not exist.

The outcome of these analyses will be the development of appropriate response measures to minimize—to the extent practicable—the occurrence of adverse effects resulting from the changed circumstances. The response measures would then be implemented. Ongoing management activities are likely to continue until new measures derived from the analyses are developed. However, in consultation with the USFWS, measures could be promptly implemented to minimize adverse effects prior to completion of the analysis, to the extent feasible.

7.3 Unforeseen Circumstances

For the purposes of this Pima County MSCP, "unforeseen circumstances" are any events that could not reasonably have been anticipated by Pima County and the USFWS at the time of the HCP's negotiation and development, and that result in a substantial and adverse change in the status of the Covered Species.

Table 7.2 lists potential unforeseen circumstances for the Pima County Section 10 permit. During the 30-year permit period, the USFWS may determine that an event constitutes an unforeseen circumstance. To do this, the USFWS will consider—but not be limited to—the level of knowledge about the affected species and the degree of specificity of the species' conservation program under the Pima County MSCP. The

USFWS will also consider whether or not failure to adopt additional conservation measures would appreciably reduce the likelihood of survival and recovery of the affected species in the wild.

Table 7.2. Example of unforeseen circumstances, their impact on the Covered Species and/or habitat, and potential responses by Pima County that may warrant contingency efforts or funds from the USFWS.

Circumstance/Scenario	Potential Impacts	Potential Responses
Weapons of mass destruction affect the urbanized area, causing social breakdown; warfare along international border extends into biologically sensitive areas	Potential for large-scale destruction of Covered Species' habitat.	Support Federal efforts, with priority given to public health, safety, and welfare.
Massive internal or external population shifts overwhelm public services, causing the appearance of shantytowns.	Increase in landscape fragmentation, decrease in connectivity, and possible isolation of Covered Species populations, influx and spread of non-indigenous species.	Continue to conduct advance planning for future growth and development; maintain strong and adequate measures through the Pima County Comprehensive Land Use Plan and zoning ordinances.
Greatly reduced pumping along Santa Cruz River allows formation of new intermittent and perennial stream segments at Canoa, Tucson, and Marana.	Increase in riparian and aquatic vegetation communities likely to have a positive effect, particularly for native fish, frogs, and other Covered Species; potential for contamination with invasive species. Potential increase in invasive species.	Maintain strong vector and disease control monitoring and response measures at County level; coordinate efforts with State and Federal agencies.
Broad-scale poaching for subsistence.	Unlikely to directly impact Covered Species; indirect effects more likely.	Coordinate biological monitoring with AGFD and other state and Federal agencies.
Greatly increased reliance on mesquite as fuelwood.	Reduced canopy cover in mesquite savanna and mesquite forest would affect Covered Species differently.	Potential strengthening of Park rules and increased enforcement.
Ranchers decide to shift to planting and irrigating exotic grasses rather than using and managing semi-natural ecosystem.	Potential for exotic species to out-compete native species and provide less suitable habitat for Covered Species; potential for increased wildfire risk.	Such actions will be prohibited on conserved lands owned by Pima County or for which they hold a conservation easement. Work with other agencies to develop guidelines and recommendations.
Natural catastrophic events such as fire, drought, severe wind or water erosion, floods, and landslides (also landslides associated with earthquakes) of a magnitude exceeding that expected to occur during the term of the permit.	To qualify as unforeseen, this circumstance must cause a significant and adverse effect upon status of Covered Species.	None required; however, Pima County may elect to initiate habitat stabilization or to work with other agencies cooperatively to respond.
Establishment of new, non-native game animals (e.g., oryx, red or Sitka deer).	Unlikely to directly affect Covered Species; may have an indirect effect due to transmission of disease and/or due to competition for food sources and other habitat elements.	Pima County will discourage AGFD from taking such actions.
Increased acid rain.	pH changes in ponds, lakes and mountain streams which lack limy substrates, potential loss of species and populations of aquatic and other Covered Species.	Incorporate water quality monitoring into management of aquatic ecosystems.

Table 7.2. Example of unforeseen circumstances, their impact on the Covered Species and/or habitat, and potential responses by Pima County that may warrant contingency efforts or funds from the USFWS.

Circumstance/Scenario	Potential Impacts	Potential Responses
Sustained cooling trend shortens the growing season over the permit period.	Gradual long-term shifts in vegetative composition; possible decrease or die-off in species sensitive to cold (e.g., saguaro and ironwood) and increase in extent of montane species (juniper, oaks, pine).	Incorporate regional climate monitoring information into Pima County MSCP monitoring and management decision-making.
Bioengineered organisms affect functioning of Covered Species directly or indirectly.	Changes in species characteristics, changes in ecosystem functioning or ecosystem structures, changes in the water and energy efficiencies of organisms.	Support Federal efforts to detect or mitigate.

7.3.1 Procedure for Determining Occurrence of Unforeseen Circumstances

Prior to making a determination regarding the occurrence of any unforeseen circumstance, the USFWS may initiate the following steps:

Identification of Problem. The USFWS may provide written notice to Pima County, together with a detailed statement of the facts, regarding the unforeseen circumstance involved, the anticipated impact on the Covered Species and its habitat, and all information and data that supports the allegation. In addition, the notice may include any proposed conservation measure(s) that is/are likely to effectively address the unforeseen circumstance, an estimate of the cost of implementing such conservation measure(s), and the likely effects upon a) Pima County and b) the existing plans and policies of any involved Federal or state agencies. Pima County may also elect to identify unforeseen circumstances and notify USFWS, at its discretion.

Management Response. Pima County—in consultation with the USFWS—may choose to perform an expedited analysis of the Covered Species or its habitat affected by the alleged unforeseen circumstance and to modify or redirect existing conservation measures to mitigate the effects of the unforeseen circumstance, within the scope of existing funded conservation actions. To the extent that these modified or redirected conservation measures do not affect conservation of other species, habitats, or key areas, this may be deemed an adequate response to the unforeseen circumstance. If the proposed modifications or redirected conservation actions could affect the conservation of other Covered Species or its habitat, the procedure outlined below will be followed.

Submission of Information by Others. Pima County and/or other entities may have a meaningful opportunity to submit information to the USFWS and shall submit such information to the USFWS within 60 days of the written notice as provided above. Upon the written request of any applicant or participant, the time for submission of this information may be extended by the USFWS, which will not be unreasonably denied.

County Review. Within 30 days after the close of the period for submission of additional information, Pima County shall assess: (a) the alleged unforeseen circumstances; (b) the proposed additional conservation measure(s); (c) its effects upon the Covered Species and its habitat and the economy and lifestyles of Pima County residents; and (d) possible alternatives to the proposed additional conservation measures which would result in the least adverse impacts upon the economy and lifestyles of Pima County residents and those private parties who own Mitigation Land, while at the same time leading to the survival and recovery of the affected species.

Findings. The USFWS may have the burden of demonstrating that an unforeseen circumstance has occurred, that such unforeseen circumstance is having or is likely to have a significant adverse impact on the Covered Species or its habitat, and that the proposed conservation measure(s) are appropriate. However, the USFWS would coordinate with Pima County in evaluating whether an unforeseen circumstance has occurred. The findings of the USFWS must be clearly documented and be based upon the best scientific and commercial data available regarding the status and habitat requirements of the species. In addition, based on the results of an expedited analysis of the changed or unforeseen circumstance and the information provided by the applicants and participants, the USFWS may provide the justification and approval for any reallocation of funds or resources necessary to respond to the unforeseen circumstance within the existing commitments of Pima County under the Pima County MSCP.

7.3.2 Response to Occurrence of Unforeseen Circumstances: No Surprises

If, after the conclusion of the process outlined above, the USFWS determines that an unforeseen circumstance has occurred and (1) additional conservation measures are required and (2) it is determined that Pima County has fully complied with the terms of the Pima County MSCP, any proposed additional conservation measures will not be the responsibility of Pima County, to the extent allowed by law. This is known as "No Surprises." If additional expenditures are required, the USFWS, other Federal agencies, and/or conservation partners may take additional actions that might lead to the conservation or enhancement of a species that is being taken by an unforeseen circumstance. The costs of these additional actions will be borne by the USFWS or other conservation partners. However, the USFWS agrees that, prior to undertaking or attempting to impose any action or conservation measure, it will consider all practical alternatives to the proposed conservation measures and adopt only those actions or conservation measures which would have the least effect upon the economy and lifestyle of Pima County, while at the same time addressing the unforeseen circumstance and the survival and recovery of the affected species and/or its habitat. The purpose of this provision is to recognize that even in the event of unforeseen, extraordinary, or changed circumstances, additional mitigation requirements are not imposed upon a Section 10 permittee who has fully implemented the requirements pursuant to an approved habitat conservation plan.

If additional monitoring and conservation measures do not adequately respond to unforeseen circumstances, the County will assist, to the extent possible, with additional conservation efforts undertaken by the USFWS.

7.4 Additional Federal Commitments

7.4.1 Limitations on USFWS Funds

Implementation of this Pima County MSCP is subject to the requirements of the Anti-Deficiency Act (31 USC §1341) and the availability of appropriated funds. Nothing in this Pima County MSCP shall be construed to require the obligation, appropriation, or expenditure of any funds from the U.S. Treasury. Pima County acknowledges that the USFWS will not be required, under this Pima County MSCP, to expend any Federal agency's appropriated funds unless and until an authorized official of that agency affirmatively acts to commit to such expenditures as evidenced in writing.

7.4.2 Section 7 Consultations and Conferences

Except as may be specifically provided elsewhere in this Pima County MSCP, nothing in the Pima County MSCP is intended to apply to any activity on Federal lands or Federally funded projects that are governed by Section 7 of the ESA. All minimization measures that result from the authorization of incidental take pursuant to Section 7 and contained within any biological opinion or conference report is expected to be generally consistent with the minimization measures required by the Pima County MSCP. However, nothing in this Pima County MSCP is intended to limit the USFWS from requiring minimization in excess of that provided for in the Pima County MSCP, if the circumstances so warrant.

7.4.3 Consideration of Pima County MSCP in Section 4 Findings

The USFWS has agreed to specifically inform Pima County of any listing proposal under Section 4 of the ESA for species in the Planning Area in writing. To the extent permitted by law, the USFWS has agreed to consider conservation actions undertaken by Pima County in making their determination.

7.4.4 Coordinating Requirements of the National Historic Preservation Act with the MSCP

USFWS actions require compliance with Section 106 of the National Historic Preservation Act (NHPA), which requires the Federal agency take into account the effects of the undertaking on historic properties eligible to be or listed in the National Register of Historic Places, consult with the State Historic Preservation Officer and affected parties, and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment. Both the NHPA and NEPA encourage coordination in the implementation of the two laws and their regulations.

Compliance with Section 106 is regulated by 36 CFR §800 and requires that Federal agencies follow a compliance process to fulfill their obligations under the NHPA. The USFWS is currently working with Pima County to finalize this MSCP and the USFWS

will consult and coordinate with tribal groups, the State Historic Preservation Office, the Advisory Council on Historic Preservation, Pima County, and other parties as part of the consultation process. The consultation will be completed prior to—or concurrent with—the issuance of the Pima County MSCP Section 10 permit, thus providing USFWS compliance with Section 106 of the NHPA for this undertaking.

7.5 New or Proposed Listings of Uncovered Species and Increased Populations of Listed but Uncovered Species: Permit Amendment

A new ESA listing or designation of critical habitat of a species not covered by this Pima County MSCP may constitute a changed circumstance. If the new circumstance increases the risk of incidental take, Pima County may wish to amend the permit. Increases of populations or geographic distribution of listed species not covered by the Pima County MSCP, for example additional species of talussnail (*Sonorella* spp.) jaguar (*Panthera onca*), ocelot (*Leopardus pardalis*), or Mexican grey wolf (*Canis lupus baileyi*), may also trigger Pima County to request a permit amendment, to the extent that the likelihood of incidental take from otherwise lawful activities covered by the plan is no longer negligible.

The USFWS will immediately notify the County upon becoming aware of these situations. Upon receipt of notice of the potential listing of a species not covered by the MSCP, Pima County may—but is not required to—enter into negotiations with the USFWS regarding necessary modifications, if any, to the Pima County MSCP. An amendment to the Federal permit would be required to cover the species. If Pima County elects to pursue an amendment of the applicable permit, the USFWS will provide technical assistance to Pima County in identifying any modifications to the Pima County MSCP that may be necessary.

In determining whether any further conservation or mitigation measures are required in order to amend the affected permit to authorize incidental take of such species, the USFWS has agreed to take into account the conservation and mitigation measures already provided in the Pima County MSCP and cooperate with Pima County to minimize the adverse effects of the listing of a species not covered by the MSCP on the Covered Activities consistent with Section 10(a)(1)(B) of the ESA, as required by the Implementing Agreement.

In the case of an unlisted species that is proposed or petitioned, and is found to be warranted for protection under the ESA, the USFWS will use its best efforts to identify any necessary measures to avoid the likelihood of jeopardy to or incidental take of the species not covered by the MSCP ("no take/no jeopardy" measures).

8 FUNDING MECHANISMS AND COMMITMENTS

Pima County commits to funding the implementation of the Pima County MSCP by securing and/or pursuing a variety of funding sources described in this chapter. Funding will be used to carry out acquisition, management, and monitoring elements of the Pima County MSCP including, but not limited to:

- New land acquisitions and other similar protections;
- Creation of mitigation banks;
- Management and monitoring of mitigation lands and associated conservation targets such as species;
- Contingency funding for private property compensation for takings pursuant to U.S. or Arizona constitutions;
- Contingency funding for changed circumstances;
- Periodic independent review; and
- Administration.

8.1 Summary of MSCP Costs

The estimated cost for administration, management, and monitoring of the Pima County MSCP for the first 10 years of the permit is, at a minimum, approximately $41 million with increases over the subsequent 20 years due to inflation (Tables 8.1, 8.2, and 8.3). Most of these costs are already incorporated into existing programs. Estimated costs are based on a range of actual administration and land management costs, as experienced during the current, non-regulatory implementation of the plan.

Land Acquisition Administration. There are no future land acquisitions that are contingent solely on issuance of the Section 10 permit so no land acquisition cost is shown on Table 8.1. The costs shown are for staff administration of future acquisition programs that might provide mitigation lands, and any related developer or Intergovernmental Agreements. These costs accrue to the County Administrator's Office at present and are estimated to decline after the fifth year of the program due to less bond acquisition activity.

County-controlled Mitigation Lands Management. Management of mitigation lands is currently funded at approximately $1.8 million per year (see Table 8.1). Future estimates are tiered to the level of stewardship provided at each site. Active management would include those used for public recreation, conservation or cultural resource education, or have portions of the property that require more intensive biological management and/or enhancements. Third party management occurs when

Table 8.1. Estimated annual cost, in thousands of dollars, for Pima County to carry out Section 10 permit activities for Permit Phase I (Permit Years 1-10).

Department/ Division	Function	Permit Year										Permit Phase 1 Total
		1	2	3	4	5	6	7	8	9	10	
Administration	Land acquisition administration [a]	23	49	51	54	57	59	29	31	32	46	$431
Development Services[b]	Planning and zoning	255	262	269	277	285	293	301	309	318	327	$2,896
Communications	Report editing, design, and production	06	06	07	07	07	07	07	07	08	08	$70
Information Technology	GIS services	72	74	76	78	80	83	85	87	90	92	$817
NRPR	Mitigation lands management[c]	1,829	1,880	1,933	1,987	2,042	2,100	2,158	2,219	2,281	2,345	$20,773
OSC	Compliance and effectiveness monitoring	579	706	795	1,091	1,253	1,288	1,324	1,361	1,399	1,438	$11,232
RFCD	Riparian Ordinance enforcement[d]	279	286	294	303	311	320	329	338	347	357	$3,164
Sheriff	Law enforcement[e]	124	128	131	135	139	143	147	151	155	159	$1,413
Transportation	Compliance and roadway design[f]	57	58	60	61	63	65	67	69	71	72	$642
Totals		$3,223	$3,450	$3,616	$3,993	$4,237	$4,356	$4,446	$4,572	$4,700	$4,845	$41,440

NOTE: Costs for managing the land acquisition program are included, but not the purchase price and associated due diligence costs. Estimated costs are indexed to inflation (2.8%; mean from 2000-2010) and Permit Year 1 estimates are based on 2009 costs, plus one year of inflation. Employee related expenses and overhead and other expenses such as equipment and supplies are included in estimates. Salary increases for performance are not included. Compliance and effectiveness monitoring costs are the only costs that are in addition to the funds already committed and being provided to fund the County's current MSCP activities. Pima County Departments/Divisions Acronyms: NRPR = Natural Resources, Parks and Recreation; OSC = Office of Sustainability and Conservation; RFCD = Regional Flood Control District.

[a] Staff time will be devoted to future bond elections and acquisition activities. Budgeted amounts include time for Real Property and County Attorneys for acquisition activities; those costs are not accounted for in purchase (i.e., Due Diligence) costs.

[b] Most of the work is related to implementing the County Comprehensive Plan and Board of Supervisors policies related to development.

[c] Budget is likely to increase as number of properties under management increases, which is not reflected in these estimates. These figures excludes non-mitigation related programs within the Natural Resource Division of NRPR (e.g., environmental education) and management of non-committed lands (e.g., Tucson Mountain Park, Agua Caliente Park).

[d] Includes $10,000 per year paid to Pima Association of Governments for work primarily performed at Cienega Creek Preserve.

[e] Costs for patrolling mitigation properties.

[f] Excludes compliance for Section 404 of the Clean Water Act.

Table 8.2. Estimated annual cost, in thousands of dollars, for Pima County to carry out Section 10 permit activities for Permit Phase II (Permit Years 11-20).

Department/ Division	Function	Permit Year										Permit Phase II
		11	12	13	14	15	16	17	18	19	20	
Administration	Land acquisition administration	47	49	50	52	53	54	56	58	59	61	$539
Development Services	Planning and zoning	336	345	355	365	375	386	397	408	419	431	$3,817
Communications	Report editing, design, and production	08	08	09	09	09	09	10	10	10	10	$92
Information Technology	GIS services	95	98	100	103	106	109	112	115	118	122	$1,077
NRPR	Mitigation lands management	2,410	2,478	2,547	2,619	2,692	2,767	2,845	2,925	3,006	3,091	$27,380
OSC	Compliance and effectiveness monitoring	1,478	1,520	1,562	1,606	1,651	1,697	1,745	1,793	1,844	1,895	$16,791
RFCD	Land mgt and Ordinance enforcement	367	377	388	399	410	422	433	445	458	471	$4,171
Sheriff	Law enforcement	164	169	173	178	183	188	193	199	204	210	$1,862
Transportation	Compliance and roadway design	75	77	79	81	83	86	88	90	93	96	$846
Totals[a]		$4,981	$5,120	$5,264	$5,411	$5,563	$5,718	$5,878	$6,043	$6,212	$6,386	$56,576

[a] Higher costs per year, as compared to previous Permit Years, is due to inflation.

Table 8.3. Estimated annual cost, in thousands of dollars, for Pima County to carry out Section 10 permit activities for Permit Phase III (Permit Years 21-30).

Department/ Division	Function	Permit Year										Permit Phase III
		21	22	23	24	25	26	27	28	29	30	
Administration	Land acquisition administration	63	64	66	68	70	72	74	76	78	80	$710
Development Services	Planning and ordinance revisions	443	455	468	481	495	508	523	537	552	568	$5,031
Communications	Report editing, design, and production	11	11	11	12	12	12	13	13	13	14	$122
Information Technology	GIS services	125	129	132	136	140	144	148	152	156	160	$1,420
NRPR	Mitigation lands management	3,177	3,266	3,358	3,452	3,548	3,648	3,750	3,855	3,963	4,074	$36,088
OSC	Compliance and effectiveness monitoring	1,948	2,003	2,059	2,117	2,176	2,237	2,300	2,364	2,430	2,498	$22,132
RFCD	Land mgt. and Ordinance enforcement	484	498	511	526	541	556	571	587	604	621	$5,497
Sheriff	Law enforcement	216	222	228	235	241	248	255	262	270	277	$2,455
Transportation	Compliance and roadway design	98	101	104	107	110	113	116	119	123	126	$1,116
Totals[a]		$6,565	$6,749	$6,938	$7,132	$7,332	$7,537	$7,748	$7,965	$8,188	$8,417	$74,570

[a] Higher costs per year, as compared to previous Permit Years, is due to inflation.

there is day-to-day management through a contractual agreement. On these lands, protection of conservation values is the primary purpose, but other activities such as grazing and recreation may be allowed. Most of the ranch lands are managed primarily through third party agreements. The actual costs of third-party management have varied from $5,000 to $15,000 per agreement approved by the Board of Supervisors, but $10,000 per agreement is assumed for the purpose of projections.

Monitoring. Future costs include surveys, mapping, data collection, data management and analysis, and reporting. As noted in Chapter 6, the proposed monitoring program will be phased in over the first five years, from an estimated cost of approximately $579,000 in Year 1 to $1.2 million by Year 5, at which time the annual cost is expected to increase by the rate of inflation.

Compliance Monitoring. These costs include compliance data management, compliance and effectiveness monitoring, reporting, permit negotiation, and administration of the private lands coverage. It also includes holding stakeholder and advisory committee meetings.

Implementation of avoidance and minimization measures for the private sector. RFCD, Development Services, and Department of Transportation are charged with the responsibility of ensuring that Covered Activities are complying with the terms of the Section 10 permit through administration of various ordinances listed in Table 4.1. These are ongoing, funded costs. Together they are expected to cost approximately $575,000 per year.

8.1.1 Pima County Sheriff's Department

Law enforcement is provided by the Pima County Sherriff's Department, which has assigned various parks and preserves to a special parks enforcement unit. Funding comes out of the general fund budget allocations to the County Sheriff. Additional law enforcement on County parks can occur via peace officers in AGFD or others, without cost to Pima County.

8.2 Assured Funding Mechanisms

Pima County will ensure that adequate funding will be available to implement the acquisition, management, and monitoring activities identified in this MSCP. This section highlights the mechanisms for achieving adequate and consistent funding.

8.2.1 General Funds

During the 13-year development of the Multi-species Conservation Plan, Pima County's General Fund has been the primary funding source for management and monitoring of future mitigation land. Until or unless the other sources of funding identified in this section (Assured Funding) are realized, the General Fund will cover the cost of the County's commitments under this MSCP. The General fund comes from the primary tax rate on property. This period of time has included the Great Recession, which prompted across-the-board reductions in departmental budgets of around 11.5%. This has led to a

temporarily reduced use of the General Fund for management of the mitigation lands, but Pima County still maintained management and rangeland monitoring functions, despite lack of any Section 10 permit obligation.

All costs in Table 8.1, except those allocated to Pima County RFCD, and a portion of those described below as private sector costs will be derived from the County General Fund. If other sources of funding become available, they may be used to reduce the general fund share. Projected costs identified in Table 8.1 are based on existing costs before budget cuts, except for the new monitoring program, which does not yet exist. This higher baseline budget provides a more reasonable basis for estimating long-term management costs as the economy recovers.

The most significant existing commitment from the General Fund, as it relates to this MSCP, is the Natural Resource Division within the Natural Resources, Parks, and Recreation Department, which has approximately 12 personnel to manage most County-controlled mitigation lands, excluding trails crews and those assigned to Tucson Mountain Park and Agua Caliente Park (i.e., non-mitigation lands). Positions include rangeland staff, open-space maintenance and operation staff, and natural resource staff. The County may increase the amount of the designated open space line-item budget as the County budget permits and such increases will be proportionate to the size, distribution, and particular needs of the lands acquired.

Pima County's management of large areas of open space began in 1929 with the establishment of the 30,000-acre Tucson Mountain Park. In the midst of the Great Depression, the General Fund was used to pay leases on Federal lands that comprised the park before Pima County acquired them and since then, the operational costs. Pima County Parks and Recreation Department was created in 1947, and has been funded for 65 years primarily from the General Fund.

The General Fund is derived from primary property taxes in Pima County. In fiscal year (FY) 2014, the County will collect $277 million in primary property taxes for the General Fund. Unlike secondary taxes, which are used to retire bonds, the primary property tax is not discretionary, meaning that it will exist, even in times of leaner budgets. As a measure of how important the General Fund is to County operations, it is important to consider that most of the County's public health, safety and welfare programs are funded by it. In fiscal year 2013, the Natural Resources, Parks and Recreation Department received only about 6% of the primary property taxes, and this percentage funded all of its activities. Therefore, the costs of financing County mitigation lands management and monitoring will always be a small percentage of this very large and stable fund.

During the most recent economic downturn Pima County's tax base declined from $9.86 billion in FY 2009/10 to as low as $7.57 billion projected for FY 2014/2015. This has been a significant factor in delaying new debt issuance for bond funding, along with Pima County's aggressive debt retirement policy.

The General Fund has proven to be a more reliable and stable source of funding than if Pima County relied upon developer fees to fund management and monitoring of acquired lands. This can be seen by examining the Development Services Department, which historically relied on developer fees, not the General Fund. Budgeted personnel expenses for that department were reduced by 50% during the Great Recession, and General Fund support to the department began in FY 2010 at the level of $2 million per year. General Fund support continues in FY 2014 at the reduced level of $500,000. If development fees or other less stable funding sources were used to fund management and monitoring activities, it would likely create an unacceptable level of inter-annual funding variability and volatility allotted to these activities. Because personnel costs make up such a large percentage of MSCP expenditures, variable funding would impact staff retention and therefore quality and continuity of management and monitoring services and data collection activities.

Even in the face of the Great Recession, Pima County has used the General Fund to maintain a reserve of at least 5% of operating costs to minimize the negative fiscal impacts of a variety of unforeseen events over which the County has had little or no control. The FY2014 Adopted Budget included a total of $22.8 million to be appropriated from the General Fund and reserved in the Budget Stabilization Fund, which was used as needed. Having a robust budgeted reserve not only contributes to fiscal resilience but also helps maintain Pima County's enhanced bond rating, which has saved approximately $2 million annually. The budget reserve also positions Pima County for dealing with changed circumstances identified under the MSCP.

Going forward, Pima County will look for efficiencies in management and monitoring responsibilities that may decrease the costs of fulfilling some MSCP obligations, even as the costs of other functions are projected to increase with inflation or acquisition of additional lands. The MSCP contains reporting and public participation requirements that will include disclosure of relevant budget information to the public as well as USFWS. The management and monitoring of the mitigation lands will be scrutinized by a variety of local organizations that will collectively help to hold the County accountable for achieving performance levels set in the MSCP, and for remaining fiscally responsible to the taxpayers.

8.2.2 General Obligation Bonds

Voter-approved bonds have been the primary assured funding mechanism for purchase of mitigation lands. Pima County has spent approximately $159 million since June 2004 on the acquisition of approximately 175,000 acres of mitigation lands (approximately 48,000 acres of fee-simple lands and 127,000 acres of lease lands; Table 8.4; see Figure 4.1). The bonds used to purchase and lease these lands are paid back over time with secondary property taxes levied by Pima County, not RFCD.

Table 8.4. Properties acquired since June 2004 that will be used to help fulfill the mitigation obligations for the Pima County MSCP.

Property Name	Acres		Acquisition Cost ($)[b]
	Fee simple	Lease[a]	
Sweetwater Preserve	695		11,733,653
Jacobs Trust	80		601,336
A-7 Ranch	6,828	33,000	2,041,933
Baker	155		226,342
Doucette	21		569,608
Bee	120		60,873
Mordka	40		20,265
Bar V Ranch	1,763	12,000	8,189,228
King 98 Ranch	1,034	3,000	2,102,921
Rancho Seco	9,574	27,000	18,503,948
Madera Highlands	366		385,733
Carpenter Ranch	360		1,100,000
Berard	7		81,792
Canoa Ranch	33		1,801,106
Poteet	83		275,820
Heater	50		991,743
Hiett	25		721,863
Selective Marketing	10		92,372
Matesich, Hyntington, and Firkins	9		188,736
Pacheco	20		241,010
Serr	10		94,776
Belvedere	72		615,972
Cates	39		132,957
Nuñez	19		68,502
South Wilmot LLC	36		112,690
Knez	80		240,967
Six Bar Ranch	3,330	9,000	11,525,322
Des Rochers	19		294,028
Buckelew Farms	505	2,200	5,080,467
Route 606	22		241,134
Canoa Ranch Phase II	52		1,200,581
Amadon	39		122,257
Chess	37		124,865
Linda Vista/Patrick	9		451,561
Reid Property	3		257,500
Tang Property	40		2,356,417
Continental Ranch Development LLC	15		750,448
Diamond Bell Ranch	191	30,600	897,730
Cochie Canyon Property	290		2,901,044
Habitat for Humanity	80		1,002,832
Sopori Ranch Phase 1	4,135	10,480	18,600,000
Tumamoc	320		4,700,000
Marley Phase 1	6,337		20,006,112
Empirita/Hartman/Cortaro	2,746		12,010,000

Table 8.4. Properties acquired since June 2004 that will be used to help fulfill the mitigation obligations for the Pima County MSCP.

Property Name	Acres		Acquisition Cost ($)[b]
	Fee simple	Lease[a]	
Clyne	800		4,900,000
Sands Ranch	5,040		21,000,000
Buehman Canyon	2,286		40,000
Susan North	9		165,000
Rocking K	104		1,008,750
Tortolita Mountain Park Expansion	1,418		3,590,00
M Diamond	604	9,584	400,000[c]
Total	49,960	136,864	$164,822,194

[a] Lease acres include State Trust, U.S. Forest Service, and BLM lands. Total leased acres differs from Table 4.3 because U.S. Forest Service, and BLM lands are not being used for mitigation.
[b] Does not include Due Diligence costs, which has averaged 1.9% of the total expenditures.
[c] Pima County RFCD paid this amount, with the bulk of the purchase price being paid for by the Oracle Mining Corp.

8.2.3 Flood Control District Tax Levy

RFCD operating funds, derived from a secondary property tax authorized under Title 48 of the Arizona Revised Statutes, are currently used to fund management and monitoring of District-owned lands, including all those identified as Floodprone Land Acquisition Program lands. Some of these RFCD-owned lands will be used as mitigation land under the Section 10 permit. Ongoing funded activities include fencing, signage and development of management plans. Once acquired, the RFCD ensures the property is secured, cleared of hazards, and managed, maintained and (if necessary) restored to the open-space character appropriate for the property. The funds may be used to demolish structures in the floodplain. In addition, these funds are used to manage invasive plants, conduct resource surveys, and to fund water resource monitoring on acquired lands. RFCD funds are also used to avoid, minimize, and mitigate impacts on riparian areas through administration of the Riparian Habitat provisions of the RFCD's Ordinance. Projected costs are based on current expenditures for management, monitoring and ordinance enforcement. About 13,000 acres of the current lands proposed for mitigation under the MSCP are RFCD-owned lands.

8.2.4 Development Agreements

The following are agreements that have been made since the adoption of the County's Comprehensive Land Use Plan update (2001). Some of these projects will provide funding for management of mitigation lands.

- Starr Pass Marriott, adjacent to Tucson Mountain Park, provides funding from hotel sales to Pima County Natural Resources, Parks and Recreation Department. During FY 12/13, the fund produced $350,000. These funds are included in the Natural Resources, Parks and Recreation row in Table 8.1. The

funds are administered with input from an advisory board and are used to support management of lands near the Tucson Mountain Park and buffelgrass management, and to reimburse the general fund for past acquisition of the Sweetwater Preserve. In the future, these funds are expected to increase to around $75,000 per month, and may support additional mitigation land acquisition or land management in the vicinity of the Tucson Mountains; and

- The Stone Canyon development agreement provided for mitigation land set-asides along Big Wash and Honey Bee Wash, two Important Riparian Areas in the CLS. The agreement also funded rehabilitation of former farm fields along Big Wash. Post-construction maintenance and monitoring of the Big Wash Xeroriparian Project on County Flood Control District land is being privately funded. This restored land would be used for mitigation under the MSCP.

8.2.5 Permit Fees

The Development Services Department is an enterprise operation; hence these permit fees are the primary source of funds that support departmental operations including the administration of those Zoning Code requirements and Comprehensive Plan Environmental Policies identified in Table 4.1 that result in avoidance and minimization actions.

8.3 Potential Funding Mechanisms

8.3.1 Private Sector Funding for Mitigation and Minimization of Habitat Loss

Pima County, as authorized by the Board of Supervisors, will collect an application fee, at the minimum, from participants who elect coverage under the Opt-in Provision. Those developments that provide mitigation land in accordance with the Opt-in Provision will, as authorized by the Board of Supervisors, be assessed a Compliance Monitoring fee; this fee is to defray the County's costs associated with aerial monitoring of those areas and review for conformance with legal restrictions. However, because assessment of fees is at the discretion of the Board of Supervisors and a property owner has the choice about whether or not to initiate the process to obtain a Certificate of Coverage through the Opt-in Provision, the amount of funds to be generated via this provision is unpredictable. The USFWS, therefore, has determined that these monies are not considered to be an assured source of funds to maintain this MSCP.

The private sector also bears costs associated with the avoidance and minimization practices exercised through compliance with Pima County Code requirements (e.g., Native Plant Preservation Ordinance, Watercourse and Riparian Protection and Mitigation Requirements, Outdoor Lighting Code) and implementation of rezoning conditions that require natural open space set-asides for compliance with the CLS conservation guidelines as applied by the Board of Supervisors. This includes maintaining the undeveloped nature of any set-asides associated with native plants and riparian habitat. The USFWS also does not consider the funds expended by private property owners for these purposes to be an assured funding source for this MSCP.

8.3.2 Future Open-space Bonds

Pima County is likely to continue to use bonds to acquire open space and flood-prone lands (Pima County 2013a, 2013b; Pima County Administrator's Office 2013a, 2013b). In 2004, voters approved $174.3 million in open space bond funds, which included $112 million for purchasing lands that Pima County is prepared to commit to conservation as mitigation credit under the Section 10 permit. Voters previously authorized bond funding in 1997, 1986, and 1974. Pima County RFCD expended almost all of its $5 million in general obligation bonds for acquiring flood-prone lands. Bond funds are also used prior to or immediately after the purchase of lands as part of the due diligence process. Here the focus is on establishing boundaries of the new acquisitions; and identifying, investigating, and securing imminent hazards such as open wells or shafts.

Because past approval rating of open space general revenue bonds by Pima County citizens has been high, and because Pima County has signed options to acquire additional ranch land in the CLS in the future, it is anticipated that voters will approve at least one future open-space or flood-prone bond election during the 30-year term of the permit. New land acquisitions may be eligible as mitigation credit under the terms of this MSCP. Nothing in the MSCP requires that Pima County acquire additional land, although failure to do so could lead to a shortfall in mitigation acreage and thus preclude extending the benefits of the Section10 permit to additional development activities.

8.3.3 Flood Control District Tax

Pima County will continue to use, from time to time, the RFCD taxing authority to acquire valued flood-prone land, riparian habitat, and water rights. To accomplish this, the RFCD will allocate its line-item budget for this CIP project with flood control tax levy funds as economic conditions allow, subject to Board approval.

8.3.4 Donations, Dedications, and Land Exchanges

Pima County has and will continue to receive donations and voluntary dedications of private property. To date, over 1,600 acres of land have been donated to Pima County. We anticipate that some of the donations will qualify as mitigation lands. In addition, dedications will continue to occur through subdivision plats and development plans. Some of these dedications may receive permanent protection as mitigation lands. Pima County has and will continue to exchange lands with other entities including municipalities, BLM and private property owners. Some of the lands received through land exchanges may later be permanently protected as mitigation lands.

8.3.5 Funding Regional Transportation Improvements to Reduce Fragmentation

In 2006, the Regional Transportation Authority was given voter approval for $45 million for improving biological connectivity under and over new roads and highways and for retrofitting older roads and highways throughout eastern Pima County. Funding will also be used to assess the efficacy of these measures and to investigate the general impacts of roads on wildlife populations. These funds will help leverage other funds,

such as Federal Highway Administration funds. The amount of money applicable to the Permit Area is not available at this time, but all of the money will be spent in the Planning Area. The largest single project under construction at this time is the State Route 77 Wildlife Crossing, for which Arizona Department of Transportation will receive a minimum of $8.2 million.

8.4 Additional Potential Funding Sources

8.4.1 Other NRPR Sources

Special revenue funds will be established for the ranch conservation program specifically. These funds will track donations and revenue tied to particular conservation properties. County-owned conservation lands have products and materials that if sold, could generate revenue that could be placed into these funds.

8.4.2 State Grants

Heritage Fund. Pima County has received funds from AGFD for allowing recreational access onto County lease lands, and the County has received Heritage Funds for various projects and will continue to submit grant requests for Heritage and other AGFD funding programs. Pima County will request that the Arizona legislature abide by the will of the voters who established the Heritage Fund in 1990 (ARS §5-22), and maintain the Heritage Fund as dedicated funding for the purposes for which it was established.

Other funding sources that may be used to supplement acquisition, management, monitoring, research or voluntary enhancement activities include:

- Arizona Water Protection Fund;
- Arizona Water Quality Grants;
- Arizona Preserve Initiative; and
- Public lotteries.

8.4.3 Federal Line-item Appropriations

Pima County will continue to encourage Congressional Representatives to pursue line-item appropriations to support partnerships and other efforts (excluding mitigation) that contribute to the goals of the Pima County MSCP.

8.4.4 Section 6 Grants: Federal

Pima County will continue to pursue Section 6 grants that are a part of the Cooperative Endangered Species Conservation Fund. This grant opportunity provides funding to States and Territories for species and habitat conservation actions on non-Federal lands. Funded activities include land acquisition, habitat restoration, species status surveys, public education and outreach, captive propagation and reintroduction, nesting surveys, genetic studies, and development of management plans. Section 6 grants are not allowed to be used for mitigation purposes, but nevertheless can be an invaluable tool to further the conservation goals of the Pima County MSCP. Pima County has applied for and received Section 6 planning and acquisition grants from the USFWS to

acquire properties and, most recently, to provide assistance to develop the monitoring program.

8.4.5 Other Federal Grants

Pima County has obtained and completed projects using U.S. Department of Agriculture Wildlife Habitat Improvement Project grants to build wildlife waters, re-introduce species, restrict access to bat roosts and appropriately fence riparian areas. Pima County has cooperated with BLM on several grant sources to fence riparian areas and clean up trash from undocumented migrants. Pima County will continue to pursue Federal funding to support non-mitigation activities from sources such as:

- Department of the Interior;
- Department of Agriculture;
- Department of Defense;
- The Land and Water Conservation Fund;
- National Fish and Wildlife Foundation Challenge Grants;
- Applicable Farm Bill funding;
- National Oceanic and Atmospheric Administration; and
- Other Federal programs.

9 REPORTING AND PUBLIC PARTICIPATION

9.1 Reporting

9.1.1 Annual Reporting

Pima County will prepare and submit an annual report to the USFWS for the purpose of permit compliance (see Appendix P). This annual report will be the primary document in support of USFWS-required status reports for permit continuance. The primary focus of the report will be to quantify impacts of Covered Activities, acres of mitigation lands and their location by way of the mitigation categories (Outside CLS, Biological Core Management Area, Multiple Use Management Area, and Important Riparian Area). This information will also be provided to the USFWS in ways that will assist their regional conservation efforts, for example, information can be arranged by vegetation type or some other ecologically meaningful units. Maps will be included that show the locations and configuration of areas where incidental take has occurred and where mitigation has been provided. The report will also provide updates on implementation of the Pima County MSCP, including financial responsibilities and obligations, management responsibilities, changes due to annexations by other entities, changes to the Capital Improvement Program, the results of monitoring and adaptive management, and other requirements of the permit. The results of the compliance monitoring report will be discussed with USFWS in an annual meeting, followed by a presentation to the public. To the extent possible, the annual report should inform the decision-making process with:

- Clear and detailed contingency action steps or plans if conditions of the permit or Implementing Agreement are not being met;
- Changes to improve the compliance monitoring program or management strategies (adaptive management); and
- Detailed maps and corresponding tabular data that depict habitat loss and mitigation and changes to the Permit Area and eligible monitoring lands.

9.1.1.1 Reporting Habitat Loss

Within the Permit Area, habitat loss will be reported by the Office of Sustainability and Conservation or other entity within the County. Habitat loss will be quantified by comparing the impacts (in acres) from Covered Activities to acres of modeled habitat or PCA for each Covered Species. The location and amount of habitat loss relative to CLS mitigation categories will also be reported as outlined in Appendix B, which describes how Pima County will calculate take from Covered Activities and the corresponding mitigation obligation. These data will be reported annually. After the initial year, annual reports will, to the extent possible, present a cumulative analysis, as well as an analysis that calls out this information for the current year.

Variations in this annual analysis may occur as the result of factors such as: 1) changes to the geographic extent of the Permit Area because of annexations of land into incorporated jurisdictions; and 2) modifications to modeled habitat or PCAs which reflect improved knowledge about any Covered Species or changed circumstance (Appendix R). It is important to note that the number of acres of impact resulting in take versus the number of acres of land that Pima County is putting toward mitigation in any given year may not reach the minimum 1:1 equivalency (see Section 4.4) for each Covered Species. This is because the amount of mitigation each year will be calculated based on the CLS (see Appendix B). Species-by-species equivalency will be reported annually; mitigation obligations must be evaluated and adjusted at the 10-year review.

9.1.1.2 Reporting Lease Lands that Contribute to Mitigation

Pima County is proposing the use of lease lands in partial fulfillment of our mitigation requirements, as outlined in Section 4.4.1 of this report. Unlike fee-simple lands upon which we will place conservation easements to fulfill our mitigation requirements, Pima County cannot commit lease lands to conservation in perpetuity. Therefore, for each annual report, Pima County will identify the acreage and location of lease lands that contributed to mitigation during that time period, if any, according to the procedures in Appendix B. For example, if Pima County has a mitigation requirement of 3,000 acres, we may choose to commit 2,000 acres of fee-simple lands. Based on the partial credit of lease lands (25%), Pima County would identify 4,000 acres of lease land to mitigate for the remaining 1,000 acres. Over the years, the acreage and location of mitigation lease land could be subject to change as grazing leases are relinquished or sold, or fee-simple land is committed in their place. It is also likely that these lease lands could be maintained as mitigation lands for the duration of the permit.

9.1.2 Decennial Reporting

At the end of each of the three permit phases, Pima County will submit a report to the USFWS containing a complete accounting of habitat acreage impacted by Covered Activities and mitigated during the previous 10-year phase. Similar to the annual reporting, this accounting will specify the number of acres mitigated and impacted by CLS category and, most importantly, by each Covered Species. The report will also describe how mitigation is proceeding relative to impacts and how the preserve assembly is consistent with the biological goals and preserve design criteria established by STAT (i.e., conservation of PCAs, potential habitat, and vegetative communities). Prior to the end of each permit phase, Pima County will initiate an analysis of the levels of conservation and mitigation achieved under the permit, which will be subject to peer review.

9.1.3 Comparison of Annual and Decennial Reports

To summarize, the annual report and the decennial report vary in function, scope, focus, and intended use (Table 9.1). The annual report will provide a cumulative snapshot view of annual changes, identify necessary adjustments, and document compliance. The decennial report is intended to evaluate progress, identify potential need for change,

and set the goals and direction for subsequent permit phases. The annual report will still be submitted during years in which a decennial report is also provided.

Table 9.1. Comparison of annual and decennial reports.

Function	Annual Report	Decennial Report
Effectiveness Monitoring	Annual or as needed depending on parameter	Determination if the goals and objectives of all parameters are being met.
Breadth of Geographic Scope	Pima County's Permit Area	Planning Area and Permit Area in order to gain a landscape-level understanding of biodiversity and ecosystem health in a regional context (i.e., relationship of Pima County's Permit Area with adjacent jurisdictions' conservation and development patterns)
Focus of Effort	Trends reporting (as appropriate). Data and tracking. Evaluate progress, level of success, and compliance	Evaluate progress and level of success in meeting SDCP goals; project future course of action.
Participation	Pima County and USFWS	Pima County and USFWS; partnering entities; adjacent jurisdictions, the general public.
Reviewing Entities	Pima County staff, STAT, and USFWS	Public, external review committee of scientists, and USFWS.
Primary display tools	Aerial photographs, satellite imagery, GIS, monitoring data tables, Pima County departmental information	Summaries of monitoring and management information; new knowledge gained on conditions, trends, and needs for Covered Species.
Desired Outcome	Determination that conservation and mitigation levels are staying ahead of impact levels, and that the specific, quantitative terms of the Section 10 permit are being met	Review and update goals for the next Permit Phase of the permit (research, monitoring, management, acquisitions, funding, conservation levels for CLS categories, PCAs, species' potential habitat). Determine if biases exist in the conservation and acquisition program and if additional conservation measures are needed to achieve goals. Finally, is mitigation equivalency of each species being met?

9.2 Audit

Financial expenditures will be reported annually to the USFWS as described in Appendix P. Formal financial audits would only occur once every three or more years, or as determined by the USFWS.

9.3 Responsibilities of Permit Participants

9.3.1 Pima County

Pima County's role is that of the permittee, with central responsibility of ensuring that all requirements of the Pima County MSCP are met—most importantly that:

- Any taking will not appreciably reduce the likelihood of the survival and recovery of the species;
- Take is incidental;
- Impacts are minimized and mitigated to the maximum extent practicable;

- Adequate funding is provided; and
- Other permit requirements are met.

The responsibilities of Pima County are described further in the Implementing Agreement (Appendix D).

The Pima County Office of Sustainability and Conservation will be responsible for keeping County departments informed about—and engaged in—permit obligations. Pima County will create an internal committee of representatives from Pima County departments responsible for implementing the permit; the Office of Sustainability and Conservation will chair this committee. A primary focus of this committee will be to refine protocols to account for habitat loss and lethal take and coordinate minimization, management, and monitoring activities.

9.3.2 Pima County RFCD

The RFCD is a co-permittee, responsible for the following:

- Providing adequate funding for RFCD responsibilities;
- Cooperating in monitoring activities on RFCD mitigation lands;
- Enforcing terms of legal instruments granted by Pima County to RFCD to ensure protection in perpetuity on County mitigation lands;
- Granting of conservation easements or restrictive covenants on RFCD-owned lands identified as mitigation land; and
- Minimizing impacts and notifying County of amendments to the Floodplain and Erosion Hazard Mitigation Ordinance as described in Table 4.1.

The responsibilities of RFCD are described further in the Implementing Agreement (Appendix D).

9.3.3 USFWS

The USFWS is responsible for ensuring NEPA compliance for the Pima County MSCP and making the final determination of permit requirements and issuance. Local and regional USFWS staff will track and monitor permit compliance annually and decennially and may enforce permit restrictions when permit requirements are not being met (see Appendix D). The USFWS may provide Federal funding for the implementation of various activities that are unrelated to the mitigation and monitoring requirements of the Pima County MSCP.

9.3.4 Private Sector

At the property owner's discretion, Pima County will cover certain development activities on private property as identified in Section 3.4.1.1. The responsibilities of the private

entities receiving the coverage vary according to the requirements of the Opt-in and Opt-out provisions but, collectively, include abiding by the provisions of the building and site construction permits issued by the County; and maintaining allegiance to the terms of the legally enforceable instrument used to protect privately owned mitigation land provided through the Opt-in Provision. Some responsibilities pass to future property owners where terms of the legally enforceable instrument used to protect privately owned Mitigation Land are transferred with property ownership.

9.4 Public Participation and Oversight

The public has demonstrated strong support for and involvement in the conservation of Pima County's natural resources throughout the development of the MSCP and SDCP. Maintaining this public support is vital to Pima County's ability to fulfill the commitments made in this MSCP. This participation means that the public provides a "watchdog" function to monitor Pima County's implementation of the MSCP. Pima County will continue to foster and welcome the public's role in the MSCP. Examples of public participation that Pima County intends to pursue include collaborative partnerships (below) and public outreach. For the latter, Pima County staff will be available for presentations at public or special interest group meetings to report on the program and its progress. Pima County will also prepare reports and newsletters, maintain space on Pima County's website for MSCP information, and make use of other forms of media to communicate the status and progress of Pima County MSCP. Ten-year reviews will also have significant involvement by the public.

Pima County may also use interested citizens to monitor sites and collect data on the condition of resources. At this time, Pima County will not commit to include this effort in the MSCP, but such an effort would be in keeping with our commitment to advance the goals of the SDCP through education, outreach, and participation.

9.4.1 STAT

The STAT was instrumental in the development of the SDCP and MSCP. A New STAT will be assembled within 12 months of permit issuance for the development and implementation of the PCEMP by:

- Overseeing the implementation of the Effectiveness Monitoring and Adaptive Management components of the Pima County MSCP including integration among parameters;
- Reviewing the annual Effectiveness Monitoring Report that summarizes work completed during the previous year regarding monitoring species, habitat, ecosystem, climate, and threats parameters;
- Identifying and prioritizing research needs;
- Providing guidance for integration with other monitoring and research efforts in the region by other state, federal, and local entities;

- Reviewing proposed changes to protocols;
- Reviewing changes to PCAs and habitat models used to measure habitat loss and protection of Covered Species; and
- Recommending changes in mitigation credit for Stewardship Levels on ranch lands.

9.5 Voluntary and Collaborative Partnership Opportunities

Pima County will continue to seek out partnership opportunities in support of implementing the goals of the Pima County MSCP on a landscape scale, thereby extending its effectiveness beyond the boundaries of the Permit Area. To formalize these relationships, Pima County intends to seek formal agreements that commit signatories to a long-term course of action and management towards fulfilling the biological goals set forth during the SDCP planning process, as reflected by the CLS.

Pima County will also foster partnerships with other local jurisdictions within and adjacent to Pima County and will support their habitat conservation planning and implementation efforts, particularly the HCPs of the Town of Marana and City of Tucson. Pima County will also foster cooperation and provide resources to those partners that contribute to the implementation of the Pima County MSCP. Pima County will foster partnerships with the University of Arizona, Pima Community College, and public and private schools in order to maximize effectiveness of research and education efforts pertaining to the Pima County MSCP goals.

Pima County will pursue partnering opportunities in association with private landowners and non-profit organizations with common conservation goals (e.g., The Nature Conservancy of Arizona, Arizona-Sonora Desert Museum, Sky Islands Alliance, Tucson Audubon Society, Tucson Herpetological Society, the Sierra Club, Arizona Land and Water Trust, the Sonoran Institute, and the National Wildlife Federation). Such partnering efforts may include but are not limited to:

- Shared staffing and use of equipment;
- Matching or other shared funding of land acquisitions and/or conservation easements;
- Joint efforts in management activities;
- Public information, outreach, and environmental education efforts and materials; and
- Coordination and use of local contributions, including land, trusts, volunteer support, and other in-kind services..

10 GLOSSARY OF TERMS AND ACRONYMS

10.1 Terms

Adaptive management. Adaptive management is an iterative learning process that identifies gaps in understanding, facilitates action, and modifies management based on new information (Walters 1986). Pima County will employ two types of adaptive management: 1) those decisions for which a single management action is needed (responsive management actions) and 2) decisions that require recurrent actions (recurrent decisions).

Biological Core Management Areas. One of four CLS land type categories that are the underpinnings of MSCP mitigation requirements. Originally identified through development of the CLS and which denotes those areas that support high biological diversity, as noted by the presence of modeled habitat for five or more Priority Vulnerable Species.

Board. Referred to collectively as the Board of Supervisors for Pima County and the Board of Directors for the Pima County RFCD.

Building Permit. Construction plans, including a site plan, approved by Pima County Development Services that authorizes the building and construction of new buildings and structures. For purposes of providing Section10 permit coverage for development on private property, only those building permit applications for non-commercial, residential projects requiring grading of 14,000 square feet or more are eligible to decline coverage via the Opt-out Provisions.

Built environment The GIS shapefile representing pre-permit land uses in Pima County. It was developed in 2008 by Pima Association of Governments, and updated by Pima County.

Cienega. A permanently or seasonally saturated "seep wetland," dominated by sedges and other herbaceous and woody wetland plants.

Candidate species. Plants and animals for which the USFWS has sufficient information on their biological status and threats to propose them as endangered or threatened under the ESA, but for which development of a listing regulation is precluded by other higher priority listing activities.

Certificate of Coverage. A County-issued document certifying that all necessary requirements have been met and that Pima County is extending the benefits of its Section 10 permit to private property where certain grading and ground disturbances are authorized by Pima County Development Services.

Certificate of Inclusion (Biological). A County-issued certificate that affords protection under Pima County's Section 10 permit for implementation of biological enhancements.

Changed circumstances. "Changes in circumstances affecting a species or geographic area covered by an HCP that can reasonably be anticipated by Plan developers and the USFWS and that can be planned for (e.g., the listing of a new species, or a fire or other natural catastrophic event in areas prone to such events)" (50 CFR §17.3). If additional conservation and mitigation measures are deemed necessary to respond to changes in circumstances that were provided for in the HCP, the USFWS can request changes, but cannot require that the permittee(s) comply. Permittees will be expected to implement the measures specified in the HCP, but only those measures and no others.

Conservation target. Species, their habitat, or other environmental feature that are the subject of management actions or concerns.

County. When referring to the applicants, Pima County and Pima County RFCD. When referring to mitigation lands, lands managed by either of the two applicants.

Covered Species. Subset of Priority Vulnerable Species that are proposed for coverage under Pima County's Section 10 permit.

Critical habitat. Once USFWS designates critical habitat for species listed as endangered or threatened, the ESA prohibits any Federal action that would adversely modify the designated critical habitat.

Ecosystem. A dynamic and interrelating complex of plant and animal communities and their associated nonliving (such as physical and chemical) environment.

Endangered species. Designation under the ESA of 1973 (as amended) which identifies an animal or plant species in danger of extinction throughout all or a significant portion of its range.

Endangered Species Act (ESA) of 1973, as amended. Federal legislation that is intended to provide a means to conserve the ecosystems upon which endangered and threatened species depend and provide programs for the conservation of those species, thus preventing extinction of plants and animals. Some relevant sections of ESA to this MSCP are:

> **Section 4**. Addresses the listing and recovery of species and designation of critical habitat.
>
> **Section 6**. Focuses on cooperation with the states and authorizes USFWS and National Oceanic and Atmospheric Administration Fisheries to provide financial assistance to states that have entered into cooperative agreements supporting the conservation of endangered and threatened species.
>
> **Section 7 (a)(2)**. Requires Federal agencies, in consultation with USFWS and/or National Marine Fisheries Service, to ensure that any Federal action is not likely to jeopardize the continued existence of any endangered or threatened species or result in destruction or adverse modification of designated critical habitat.

Section 9. Defines prohibited actions, including the import and export, take, illegally taken possession of illegally taken species, transport, or sale of endangered or threatened species.

Section 10(a). Lays out the guidelines under which a permit may be issued to authorize prohibited activities, such as take of endangered or threatened species.

Section 10(a)(1)(A). Allows for permits for the taking of threatened or endangered species for scientific purposes or for purposes of enhancement of propagation or survival.

Section 10(a)(1)(B). Permit for incidental taking of threatened or endangered species provided that a conservation plan is in place.

Exotic species. A species of plant or animal that is not native to the ecosystem in which it is living. See Invasive Species.

Federally listed species. See under ESA of 1973, as amended, Section 4. Also see Endangered Species and Threatened Species.

Fee simple. A term of property law where the owner has title (i.e., ownership) to the land.

Geographic Information System (GIS). Means of digital mapping and data analysis on computers.

Habitat. Environmental features that provide resources for species to carry out their life-history functions.

Habitat Conservation Plan (HCP). A plan that specifies: 1) the impact which will likely result from such taking (of Covered Species); 2) what steps the applicant will take to minimize and mitigate such impacts, and the funding that will be available to implement such steps; 3) what alternative actions to such taking the applicant considered and the reasons why such alternatives are not being utilized; and 4) such other measures that the Secretary of the Interior may require as being necessary or appropriate for purposes of the plan. An HCP is required before a Section 10(a)(1)(B) permit may be issued.

(to) harass. ESA implementing regulations define "to harass" as "intentionally or negligently, through act or omission, create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns such as breeding, feeding, and sheltering."

(to) harm. ESA implementing regulations define "to harm" as to "perform an act that kills or injures wildlife; may include significant habitat modification or degradation when it [*sic*] kills or injures wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering."

Implementing Agreement. Specifies all terms and conditions of activities under the HCP. By signing the Implementing Agreement, USFWS explicitly acknowledges approval of the plan and declares that it meets the requirements of an HCP to allow issuance of appropriate permits for target or other named species, should those species become listed.

Important Riparian Areas. One of four categories of lands that are the underpinnings of MSCP mitigation requirements. Originally identified through development of the CLS and which denotes those riparian areas valued for their higher water availability, vegetation density, and biological productivity. These areas are also fundamental to preserving landscape connectivity.

Incidental take. Take that results from, but is not the purpose of, carrying out an otherwise lawful activity. Take can be both lethal and non-lethal.

Incidental take permit (also called Section 10 permit). A permit issued under Section 10(a)(1)(B) of the ESA to a non-Federal party undertaking an otherwise lawful project that might result in the incidental take of an endangered or threatened species. Application for an incidental take permit is subject to certain requirements, including preparation by the permit applicant of a conservation plan, generally known as an HCP.

Indirect effect. An effect caused by a proposed action that takes place later in time than the action, but is still reasonably certain to occur.

In-Lieu Fee (program). The In-Lieu Fee program, which could be operated by Pima County (meaning Pima County or RFCD), collects funds from private sector entities seeking to fulfill their compensatory mitigation requirements of Section 404 of the Clean Water Act. As the sponsor, Pima County would use the funds pooled from multiple permittees to create one or more sites under the authority of the agreement to compensate for aquatic resource functions lost as a result of the permits issued. See also Mitigation Bank.

Invasive species. Organisms that invade ecosystems beyond their historical range. Their invasion can threaten native ecosystems or commercial, agricultural, or recreational activities dependent on these ecosystems, costing the economy billions annually.

(to) jeopardize a species. To engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

Maeveen Marie Behan Conservation Lands System (CLS). The biological reserve system design adopted as the Regional Environmental Element of Pima County's 2001 Comprehensive Plan Update, and any subsequent revisions. The CLS provides the principal basis for the selection of lands for mitigation under the permit.

Mesoriparian. Area that is supported by perennial or intermittent streams, or areas of shallow groundwater.

Mitigation (programs/measures). Activities contributing to preserving resources and offsetting resource loss. The primary mitigation mechanism for Pima County's Section 10 permit is land acquisition, management, and monitoring, but other methods may be approved by USFWS.

Mitigation Bank or Mitigation Banking (program). Administered by the Army Corps of Engineers, a mitigation bank is a wetland, stream or other aquatic resource area that has been restored, established, enhanced, or preserved. This area is then set aside to compensate for future impacts to aquatic resources resulting from permitted activities under Section 404 of the Clean Water Act. Pima County is currently investigating the establishment of one or more Mitigation Banks and would sell mitigation credits to private sector entities seeking to fulfill compensatory mitigation requirements by the Corps. See also In-Lieu Fee program.

Mitigation lands. Those lands, leases, or rights held by Pima County and committed as compensation for impacts to habitat of Covered Species stemming from Covered Activities under Pima County's Section 10 permit. Mitigation lands are either owned in fee simple, leased, or held as a partial property right (e.g. conservation easement or other legally enforceable property right).

Mitigation lands, County-controlled. All mitigation lands for which Pima County has a property interest (e.g, fee simple ownership, conservation easement, or grazing lease). Excludes mitigation lands derived from the Opt-in Provision..

Mitigation lands, County-owned. All lands that are owned by Pima County in fee simple and used as compensation for impacts under the terms of Pima County's Section 10 permit.

Multi-species Conservation Plan (MSCP). A proposal to minimize and mitigate, to the maximum extent practical, incidental take of multiple species that may occur in the plan area due to specified, lawful activities. Serves as Pima County's HCP for purposes of obtaining a Section 10 permit under the ESA.

Multiple Use Management Areas. Originally identified through development of the CLS and which denotes those areas that support significant biological diversity, but which do not attain the level associated with Biological Core Management Areas. They connect large blocks of contiguous habitat and biological preserves and support high value potential habitat for three or more Priority Vulnerable Species.

Natural open space set-aside. Land that is undeveloped and retained as natural open space through development processes and approvals. Ownership of these areas remains with the property owner.

Non-native Species. See exotic and invasive species.

No Surprises Rule. A part of the ESA that is meant to protect the landowner if unforeseen circumstances occur that make the landowner's efforts to prevent or mitigate harm to a species fall short. The landowner or permittee would not be required to set aside additional land or water, or pay more for conservation. The Federal government would be responsible for additional protection measures.

Opt-in Provision. The process through which the County will grant Section 10 permit coverage to any property owner, at their discretion, who requires a site construction permit to develop their property as a residential subdivision or as a non-residential development. In addition to the property owner's election, receipt of permit coverage requires fulfillment of several criteria and the payment of appropriate fees.

Opt-out Provision. The process through which the County will withhold Section 10 permit coverage on an individual, single dwelling lot when the property owner, at the time of application for a building permit that includes authorization of grading 14,000 square feet or more, declines coverage.

Outside the CLS. One of four categories of lands that are the underpinnings of MSCP mitigation requirements. Generally represents those lands within Pima County that do not have a designation under the Conservation Lands System.

Participant (for MSCP). Those property owners who voluntarily solicit protections afforded by Pima County's Section 10 permit and who fulfill certain requirements.

Parameter. A component of the monitoring program that is measured and reported as an indicator of change. Examples of parameters include population size of a species, number of new miles of roads, and acres of habitat destroyed.

Pima County. When referring to the proposed permit holder, the term includes Pima County RFCD, a separate taxing authority that is governed by the same elected officials as Pima County.

Preserve Network (Pima County). Land owned and managed for open space preservation, considered in the aggregate. Includes all County-controlled mitigation lands, as well as other Pima County Preserves (e.g., Tucson Mountain Park) for which no habitat mitigation credit is being sought.

Planning Area (for MSCP). The entire 9,184 square miles of Pima County.

Priority Conservation Area. Those areas identified by species experts where conservation is necessary for the Priority Vulnerable Species' long-term survival.

Priority Vulnerable Species. A list of species that Pima County used early in the development of the MSCP and SDCP; most species are thought to be in decline or subject to one or more threats. Most Priority Vulnerable Species were considered for Section 10 permit coverage (see Covered Species).

Proposed species. An animal or plant species that is proposed in the Federal Register to be listed under Section 4 of the ESA.

Recovery Contribution Areas. Sites where Pima County management efforts will provide suitable habitat and improve habitat conditions for existing or re-established populations of species and, at the same time, allow permitted maintenance and other Covered Activities.

Regional Flood Control District (RFCD). The Pima County RFCD is a separate legal entity from Pima County, and one of the two applicants in the MSCP.

Riparian. Related to, living in, or located on the bank of a natural watercourse.

Riparian area. Area influenced by surface or subsurface water flows that are expressed (visually) by facultative wetland or obligate wetland plant species and hydric soils.

Safe Harbor Agreement. A voluntary arrangement between the USFWS (or the National Oceanic and Atmospheric Administration) and cooperating non-Federal landowners. The main purpose is to promote voluntary management for listed species on non-Federal property, while giving assurances to participating landowners that no additional future regulatory restrictions will be imposed through the issuance of a Section 10(a)(1)(A) permit under the ESA. The agreements benefit endangered and threatened species, while giving landowners assurances related to ESA regulations.

Section 10 permit. See incidental take permit.

Site Construction Permit. Previously referred to as *Paving and Grading Improvement Plans* and *Type II Grading Permits*. An engineering document approved by Pima County Development Services that authorizes the grading and paving of a project site. Required for projects generally including new commercial development and the paving and grading of subdivisions. Application to Pima County Development Services for a Site Construction Permit (including a combination Building/Site Construction Permit) is a key eligibility criterion for exercising the Opt-in Provision to obtain Section 10 permit coverage for development on private property.

Sonoran Desert Conservation Plan (SDCP). Overarching conservation plan for Pima County. The Pima County MSCP is one element of the plan, which includes cultural resource goals, as well as biological goals.

Species Enhancement Areas. Places where populations of existing and/or re-established populations of species will be managed by Pima County in relation to recovery plans.

State Trust Lands. Those lands that are held in trust for the Common Schools and other beneficiaries and whose management is overseen by the State Land Department in accordance with the Arizona State Enabling Act of 1910, the State Constitution, and the 1915 State Land Code.

Supplementary Population Management Areas. Sites where there is suitable habitat for species (though populations are expendable from species recovery efforts), but which may have the potential to contribute to recovery.

(to) Take. Section 9 of the ESA prohibits the take of threatened and endangered species. Take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct; may include significant habitat modification or degradation if such actions kill or injure wildlife by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering. Under Section 10(a) of the ESA, a level of take may be permitted if it is incidental to otherwise lawful activities and an HCP is accepted by the USFWS.

Threatened species. Designation under the ESA of 1973 (as amended) which identifies an animal or plant species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Unforeseen Circumstance: "changes in circumstances affecting a species or geographic area covered by an HCP that could not reasonably have been anticipated by plan developers and the USFWS at the time of the HCP's negotiation and development, and that result in a substantial and adverse change in the status of the Covered Species" (50 CFR §17.3). The USFWS will not require the commitment of additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources, even upon a finding of unforeseen circumstances, unless the permittee(s) consents. Upon a finding of unforeseen circumstances, the USFWS will be limited to modifications within conserved habitat areas and the HCP's operating conservation program, unless the USFWS provides additional resources to address the unforeseen circumstance.

Watershed. A region or area bounded peripherally by topographic high points and draining ultimately to a particular watercourse or body of water.

Xeroriparian. Areas associated with intermittent water supplies and that may include species from adjoining upland areas.

10.2 Acronyms

AGFD	Arizona Game and Fish Department
ARS	Arizona Revised Statute
BLM	Bureau of Land Management
CFR	Code of Federal Regulations
CFS	Cubic feet per second
CIP	Capital Improvement Program
CLS	Maeveen Marie Behan Conservation Lands System
Corps	U.S. Army Corps of Engineers

ESA	Endangered Species Act
FR	Federal Register
FY	Fiscal year
GIS	Geographical Information System
HCP	Habitat Conservation Plan
MSCP	Multi-species Conservation Plan
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRCS	Natural Resources Conservation Service
NW	Nationwide permit
ORV	Off-road vehicle
PCA	Priority Conservation Area
PCEMP	Pima County Ecological Monitoring Program
RFCD	Pima County Regional Flood Control District
RGP	Regional general permit
RPPA	Recreation and Public Purposes Act
SDCP	Sonoran Desert Conservation Plan
STAT	Science Technical Advisory Team
USC	United States Code
USFWS	United States Fish and Wildlife Service
WUS	Waters of the U.S.

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- Michael Winn, Ecological Restoration/Management Associates
- Carl Winters, Winters & Associates
- Nancy Young Wright, Buffers
- Nancy Zierenberg, Wildlife Damage Review
- Michael Zimet

- David Godlewski, Southern Arizona Homebuilders
- Priscilla Storm, Diamond Ventures
- Lisa Hoskins, Becky Gordon, Metropolitan Pima Alliance
- Kathleen Kennedy, Susan Shobe, Gabe Wigtail, Coalition for Sonoran Desert Protection
- Randy Serraglio, Center for Biodiversity
- Matt Clark, Defenders of Wildlife
- Jenny Neely, Sky Island Alliance
- Steve Huffman, Tucson Association of Realtors
- Leslie Ethen, City of Tucson
- Janine Spencer and Jennifer Christelman, Town of Marana
- David Jacobs, State Attorney General's Office (representing State Land Department)

12 LITERATURE CITED

Childs, M. R. 2006. Comparison of Gila topminnow and western mosquitofish as biological control agents of mosquitoes. Western North American Naturalist 66:181-190.

Christensen, J. H., B. Hewitson, A. Busuioc, A. Chen, X. Gao, I. Held, R. Jones, R. K. Kolli, W. T. Kwon, R. Laprise, V. M. Rueda, L. Mearns, C. G.Menendez, J. Räisänen, A. Rinke, A. Sarr, and P. Whetton. 2007. Regional climate projections. Climate Change 2007: The Physical Science Basis. Pages 847-940. *In* S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor, and H. L.Miller, editors. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, UK.

Fonseca, J., and N. Connolly. 2002. Representation of vegetation communities and Special Elements in reserve design. Report to the Pima County Board of Supervisors for the Sonoran Desert Conservation Plan, Tucson, Arizona.

Fonseca, J., and D. Scalero. 1999. Determining vulnerable species within Pima County, Arizona. Report to the Pima County Board of Supervisors for the Sonoran Desert Conservation Plan, Tucson, Arizona.

Green, R. H. 1979. Sampling design and statistical methods for environmental biologists. John Wiley and Sons, New York, New York.

IPCC. 2007. Climate change 2007: The physical science basis. *In* S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M.Tignor, and H. L. Miller, editors. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge, United Kingdom and New York, New York, USA.

Lenart, M., and B. Crawford. 2007. Global warming in the Southwest: Projections, observation, and impacts. Climate Assessment for the Southwest (CLIMAS). The University of Arizona, Tucson Arizona

Parmesan, C. 2006. Ecological and evolutionary responses to recent climate change. Annual Review of Ecology Evolution and Systematics 37:637-669.

Pima County. 2000a. Draft preliminary Sonoran Desert Conservation Plan. Report to the Pima County Board of Supervisors for the Sonoran Desert Conservation Plan. Tucson, Arizona.

Pima County. 2000b. Biological stress assessment: An overview of issues and concerns. Report to the Pima County Board of Supervisors for the Sonoran Desert Conservation Plan. Tucson, Arizona.

Pima County. 2000c. Riparian protection, management and restoration: An element of the Sonoran Desert Conservation Plan. Report to the Pima County Board of Supervisors for the Sonoran Desert Conservation Plan. Tucson, Arizona.

Pima County. 2000d. Potentially problematic species in Pima County: Ecological effects and management strategies. Draft report to the Pima County Board of Supervisors for the Sonoran Desert Conservation Plan. Tucson, Arizona.

Pima County. 2000e. Our common ground: Ranch lands in Pima County. A conservation objective for the Sonoran Desert Conservation Plan. Report to the Pima County Board of Supervisors. Tucson, Arizona.

Pima County. 2001a. Pima County Comprehensive Plan update. Adopted by the Pima County Board of Supervisors on December 18, 2001. Tucson, Arizona.

Pima County. 2001b. Priority Vulnerable Species: Analysis and review of species proposed for coverage by the Multiple-species Conservation Plan. Draft report to the Pima County Board of Supervisors for the Sonoran Desert Conservation Plan. Tucson, Arizona.

Pima County. 2001c. Reserve design process update. Draft report to the Pima County Board of Supervisors in support of the Sonoran Desert Conservation Plan. Tucson, Arizona.

Pima County. 2001d. Priority Conservation Areas. Report to the Pima County Board of Supervisors in support of the Sonoran Desert Conservation Plan. Tucson, Arizona.

Pima County. 2010. Pima County range management standards and guidelines. Developed and distributed by the Pima County Natural Resources, Parks, and Recreation Department, Tucson, Arizona.

Pima County. 2013a. 2013/2014 Sources of Funds and Uses of Tax Dollars. Accessed November 14, 2013 at http://www.pima.gov/taxes/sources-uses.shtml.

Pima County. 2013b. Adopted Budget, Budget Issues. Accessed November 14, 2013 at http://webcms.pima.gov/UserFiles/Servers/Server_6/File/Government/Finance%20and%20Risk%20Management/Adopted%20Budget/2013-2014%20single%20files/04_issue.pdf.

Pima County Administrator's Office. 2013a. Memorandum to Bond Advisory Committee dated September 13, 2013. Future Bond Election Planning. Accessed November 14, 2013 at http://webcms.pima.gov/UserFiles/Servers/Server_6/File/Government/Bonds/Future%20Bond%20Election%20Planning/bac-future.bond.election.planning.update.recommendation.pdf.

Pima County Administrator's Office. 2013b. No title, September 6, 2013 letter posting. Accessed November 14, 2013 at http://www.pima.gov/administration/documents/pdfs/130906-Letter-to-Taxpayers.pdf.

Powell, B. F. 2010. Climate change and natural resources in Pima County: Anticipated impacts and management challenges. Unpublished report of the Pima County Office of Sustainability and Conservation, Tucson, Arizona. Accessed on April 10, 2015 from: http://www.pima.gov/cmo/sdcp/reports/d52/Ecological_Impacts.pdf.

RECON Environmental Inc. 2000a. Priority vulnerable species: Habitat data analysis. Report to the Pima County Board of Supervisors for the Sonoran Desert Conservation Plan, Tucson, Arizona.

RECON Environmental Inc. 2000b. Review of vulnerable species list: Pima County, Arizona. Report to the Pima County Board of Supervisors for the Sonoran Desert Conservation Plan, Tucson, Arizona.

RECON Environmental Inc. 2001. Reserve design process update. Report to the Pima County Board of Supervisors for the Sonoran Desert Conservation Plan, Tucson, Arizona.

Rogstad, A., ed. 2008. Southern Arizona buffelgrass strategic plan. Buffelgrass Working Group, Tucson, Arizona.

Seager, R., M. F. Ting, I. Held, Y. Kushnir, J. Lu, G. Vecchi, H. P. Huang, N. Harnik, A. Leetmaa, N. C. Lau, C. H. Li, J. Velez, and N. Naik. 2007. Model projections of an imminent transition to a more arid climate in southwestern North America. Science 316:1181-1184.

Steidl, R. J., A. R. Litt, B. F. Powell, and S. Mann. 2010. Selecting parameters for ecological monitoring programs: A case study of Pima County, Arizona. Supplement to a final report to the Arizona Game and Fish Department, Phoenix, Arizona. Accessed on April 10, 2015 from: http://www.pima.gov/cmo/sdcp/Monitoring/PDF/Supplement_B_Detailed_Design_Process.pdf

Thomas, J. A., M. G. Telfer, D. B. Roy, C. D. Preston, J. J. D. Greenwood, J. Asher, R. Fox, R. T. Clarke, and J. H. Lawton. 2004. Comparative losses of British butterflies, birds, and plants and the global extinction crisis. Science 303:1879-1881.

U.S. Fish and Wildlife Service. 2000. Final addendum to the handbook for habitat conservation planning and Incidental Take Permit. Washington, D.C.

U. S. Fish and Wildlife Service. 2012. Review comments on the Administative Draft of Pima County's MSCP.

Walters, C. J. 1986. Adaptive management of renewable resources. Macmillan Press, New York, New York.