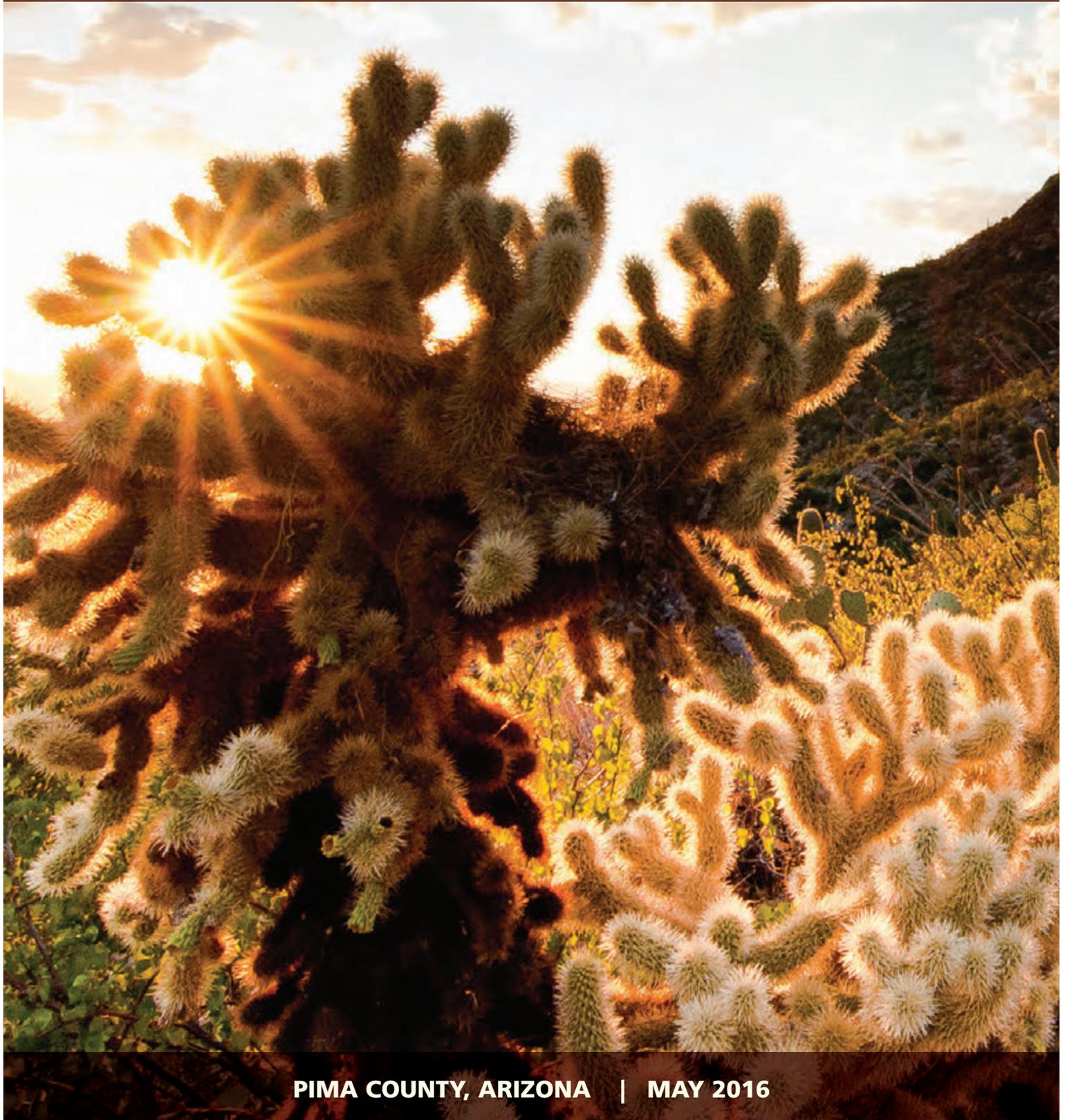




Final Environmental Impact Statement

For the Pima County Multi-Species Conservation Plan



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B:	U.S. Fish and Wildlife Letters to Tribal Representatives
C:	Disclosure Statement

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1.0 Introduction

1.1 Overview

The U.S. Department of the Interior, U.S. Fish and Wildlife Service (USFWS) has prepared this Environmental Impact Statement (EIS) to analyze potential effects to physical and biological resources and economic conditions that may result from the issuance of an incidental take permit under Section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973, as amended, to Pima County (County) in Arizona. The USFWS is the lead Federal agency responsible for the preparation of this EIS for the Pima County Multi-species Conservation Plan (MSCP) and ESA Section 10(a)(1)(B) permit request. As applicants, Pima County and the Pima County Regional Flood Control District (RFCD; the co-applicants will herein be referred to as Pima County unless otherwise noted) have been responsible for preparation of the Pima County MSCP and supporting documents.

Section 9 of the ESA prohibits the take of threatened and endangered species. Take is defined as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect” or attempt to engage in any such conduct. Harass is defined as to “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.” Harm is defined 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.” Thus, take can occur as a consequence of the loss of habitat resulting from development, land use activities, and water use, and the discretionary programs that permit these activities.

An incidental take permit process was established under Section 10(a)(1)(B) of the ESA to authorize the taking of federally listed species if such taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Section 10(a)(2)(A) of the ESA requires an applicant for an incidental take permit to submit a conservation plan that specifies, among other things, the impacts that are likely to result from the taking and the measures the permit applicant will undertake to minimize and mitigate such impacts.

This EIS was prepared in accordance with the National Environmental Policy Act (NEPA) regulations promulgated by the Council on Environmental Quality for implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] 1500–1508) and the Department of the Interior NEPA regulations, to inform the USFWS decision makers regarding whether to issue the requested ESA Section 10 (a)(1)(B) permit to Pima County.

1.2 Proposed Federal Action

The proposed Federal action for this EIS is the issuance of a Section 10(a)(1)(B) permit to authorize incidental take of listed species that may result from the otherwise lawful Covered Activities under the Pima County MSCP.

1.3 Purpose and Need for Proposed Action

The purpose of the proposed action is to respond to a request by Pima County for authorization of incidental take of listed species and impacts to non-listed species (Covered Species) as outlined in the MSCP. The permit will establish the conditions under which the Pima County MSCP may be implemented in a manner that meets the requirements for a Section 10(a)(1)(B) permit under the ESA. Before issuing a permit for implementation of the Pima County MSCP, the USFWS must evaluate impacts to the human environment resulting from actions proposed in the MSCP.

The need for the proposed Federal action is to provide a mechanism for Pima County's compliance with the ESA and other Federal laws and regulations. Due to the potential for take of federally listed species, compliance with the ESA is necessary if otherwise lawful development or disturbance that leads to take on non-Federal lands in the proposed Permit Area is to proceed.

The continued growth of the human-built environment in Pima County, Arizona, would likely result in incidental take of species that are currently, or have the potential to be, listed under the ESA. To avoid, minimize, and mitigate impacts to species and their habitats, Pima County has prepared the MSCP for species that may be taken as a result of otherwise lawful activities by Pima County, the RFCD, and the development community within Pima County.

Without a Section 10(a)(1)(B) permit for Pima County, entities wishing to develop within the Permit Area could face significant delays in meeting the housing and infrastructure needs of the local population in the proposed Permit Area, because the USFWS would need to evaluate individual projects or actions on a case-by-case basis, rather than regionally under the MSCP, and address them through the appropriate ESA and NEPA processes.

1.4 Background

Pima County prepared the Sonoran Desert Conservation Plan (SDCP) with the intent of conserving and enhancing natural and cultural resources for future generations. The planning process for the SDP began after many years of contentious land-use decisions and concerns about the destruction of natural and cultural resources to make way for housing, shopping centers, and roads. The 1997 listing of the cactus ferruginous

pygmy-owl (pygmy-owl; *Glaucidium brasilianum cactorum*) and subsequent court battles left the real estate market, individual developers, and the public sector in Pima County uncertain about what was needed to comply with the listing and associated rules. These issues prompted Pima County to develop a region-wide plan in the form of the SDCP.

Pima County decided to broaden the conversation from a single-species conservation challenge to a region-wide planning effort that sought to balance urban development and species' protections. The SDCP planning effort was initially focused on identifying a host of species that might be impacted by the expansion of residential and commercial development in unincorporated Pima County, mapping the distribution of those vulnerable species using geographic information system (GIS) tools, and determining if the County, through its land-use authority and land acquisitions, could contribute to the conservation of the species.

The SDCP established the framework and direction for preparing the Pima County MSCP for Pima County, Arizona. The Pima County MSCP was prepared in cooperation with the USFWS in accordance with the provisions of Section 10(a)(1)(B) of the ESA. A notice of availability of the Pima County MSCP for public review was published concurrent with the notice of availability of the Draft EIS. A notice of availability of this Final EIS has been published by the United States Environmental Protection Agency (EPA) in the *Federal Register* (FR).

Pima County has had one of the fastest growing human populations of any county in the United States. Pima County has a sunny climate, natural beauty, and economic opportunities that contribute to population growth. Urban growth has converted significant land areas in the past and is expected to continue into the foreseeable future. A significant proportion of the predicted future population increase is anticipated to occur in the undeveloped or underdeveloped areas of Pima County, particularly in the eastern portion of it.

The presence of endangered species in the areas of land development creates planning concerns for Pima County. Interest in conservation and in the related potential costs (e.g., land acquisition or set-asides) extends across the community from environmental advocates promoting strengthened protections to members of the business community, development industry, and real estate profession concerned about potential economic impacts. Landowners and private property interests are concerned how their land use decisions can potentially be affected by the presence of federally listed threatened and endangered species. The Section 10(a)(1)(B) process provides a means for balancing these interests and achieving regulatory compliance under the ESA.

A long-term solution to ensure ESA compliance, particularly in areas such as Pima County, where there are multiple listed species and other species of concern, is to develop a multi-species conservation plan. The cactus ferruginous pygmy-owl was listed as endangered in March 1997, triggering community discussion of endangered species

and habitat protection planning for Pima County. The pygmy-owl listing represented a critical conservation challenge because of the limited number of known individuals and because many of those individuals occurred at the urban fringe and within the development footprint of many planned projects. Although the pygmy-owl was delisted in 2006 as a result of litigation, the species highlighted the impact of development-related activities on species and opened a broader discussion of the effect of development activities on natural resources.

The Pima County MSCP proposes a combination of short-term actions to protect and enhance the natural environment and long-range planning. The Pima County MSCP would help guide public investments in both infrastructure and conservation, and establish Pima County's preference for the expenditure of funds to preserve and protect conservation lands threatened by urbanization. Pima County, in developing the Pima County MSCP, proposes to implement conservation measures that would encourage infill (i.e., building on vacant parcels of land) within existing developed areas. This would result in more efficient use of existing infrastructure in incorporated areas, curtail urban sprawl, potentially improve property values, and provide a more balanced approach to where growth is distributed.

The objective of the Pima County MSCP is to achieve a balance between:

- long-term conservation of the diversity of natural vegetation communities and native species of plants and animals that make up an important part of the natural heritage and allure of Pima County, and
- orderly use of land to promote a sustainable economy, health, well-being, customs, and culture of the growing population of Pima County.

In addition, the Pima County MSCP has been designed to:

- meet the requirements for Pima County to receive a Section 10(a)(1)(B) permit (also called an incidental take permit) pursuant to Section 10 of the ESA that would allow for incidental take of threatened and endangered species while engaging in otherwise lawful activities;
- provide conservation benefits to species and ecosystems in Pima County that would not otherwise occur without the MSCP;
- maximize flexibility and available options in developing mitigation and conservation programs;
- minimize uncoordinated decision making, which can result in incremental habitat loss and inefficient project review;

- provide Pima County (the applicants) and its development community (participants) with long-term planning assurances;
- cover an appropriate range of activities under the permit;
- avoid, minimize, and mitigate for the impacts of activities that would result in the take of threatened and endangered species and provide long-term management and monitoring programs to help ensure program effectiveness; and
- designate the funding that would be available to implement the Pima County MSCP over its proposed 30-year term.

1.5 Proposed Action and Permit Issuance Criteria

The proposed Federal action is the issuance of a Section 10(a)(1)(B) permit by the USFWS to Pima County and Pima County Flood Control District in Arizona, allowing incidental take of federally listed threatened and endangered wildlife species for a permit period of 30 years (see Section 3.3, Biological Resources). The Pima County MSCP proposes 44 species (Covered Species) for coverage under this permit application. The following species are proposed for coverage and are currently federally listed under the ESA:

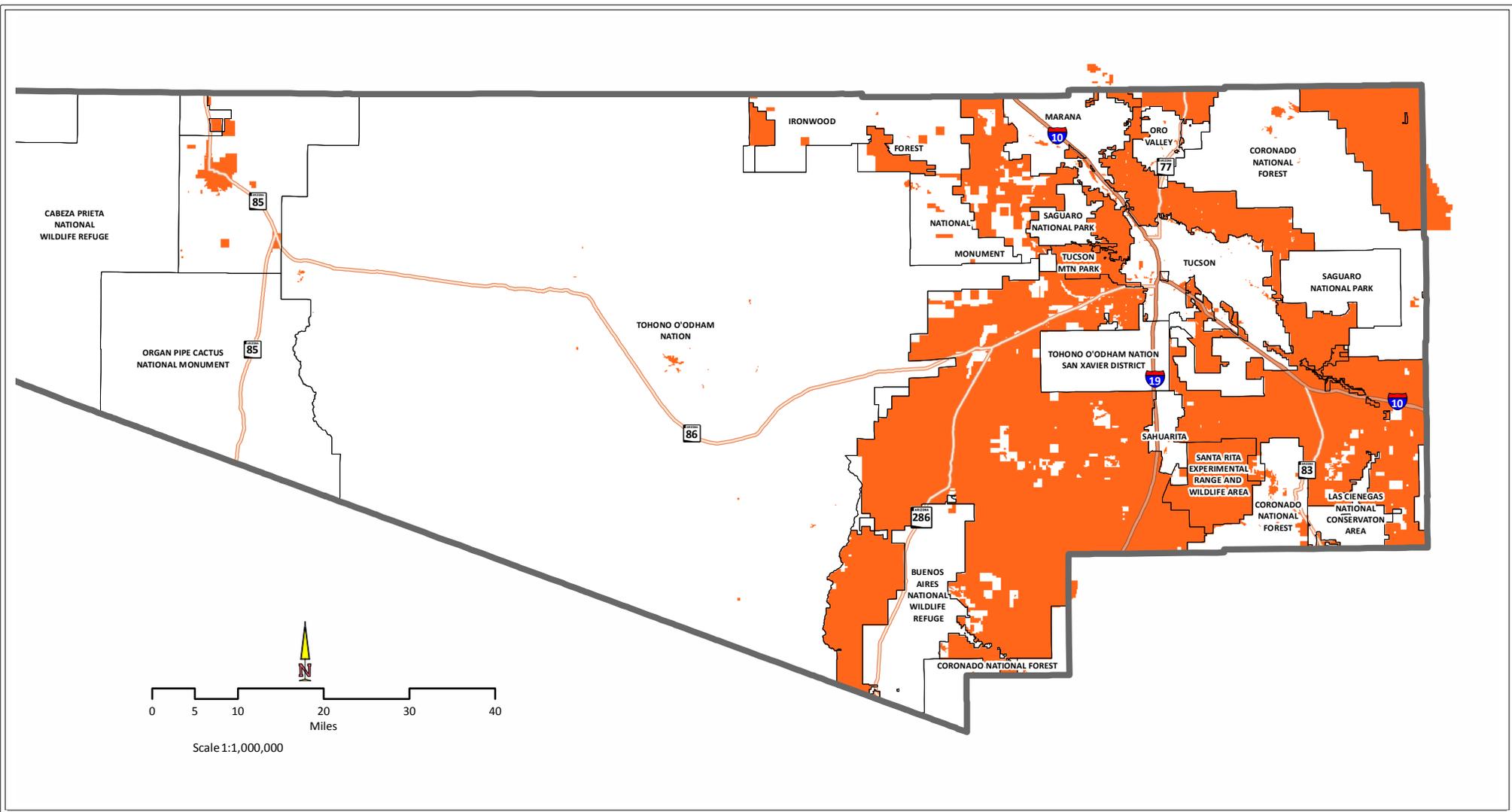
Listed endangered:

- southwestern willow flycatcher (*Empidonax traillii extimus*)
- lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*)
- Gila topminnow (*Poeciliopsis occidentalis*)
- Gila chub (*Gila intermedia*)
- Huachuca water umbel (*Lilaeopsis schaffneriana recurva*)
- Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*)

Listed threatened:

- Chiricahua leopard frog (*Rana chiricahuensis*)
- northern Mexican gartersnake (*Thamnophis eques megalops*)
- western yellow-billed cuckoo (*Coccyzus americanus*)

See Section 3.3, Biological Resources, for a complete list of species proposed for coverage under the Pima County MSCP. The areas to be covered by the permit (i.e., the Permit Area) are shown in Figure 1-1.



-  Section 10 Permit Area
-  Administrative Boundary

FIGURE 1.1
Pima County Section 10 Permit Area

The permit would allow incidental take of Covered Species as a result of Covered Activities on non-Federal lands within the Permit Area, in accordance with the terms and conditions of the Pima County MSCP. Based on Pima County's MSCP and compliance with issuance criteria, the USFWS may issue the permit with the submitted MSCP, issue the permit with a modified MSCP, issue the permit with other specific conditions as determined by the Secretary (e.g., management requirements and mitigation measures), or deny the permit. Section 10(a)(2)(B) of the ESA requires the following criteria to be met before the USFWS can issue a permit.

The permit issuance criteria are as follows:

1. The taking will be incidental. Under the ESA, all taking of federally listed fish and wildlife species included in the Habitat Conservation Plan (HCP) must be incidental to otherwise lawful activities and not the purpose of such activities.
2. The applicant will, to the maximum extent practicable, minimize and mitigate the impacts of such taking. The applicant decides during the HCP development phase what measures to include in the HCP (though the applicant does so in light of discussions with and recommendations from the USFWS). However, the USFWS ultimately decides, at the conclusion of the permit application processing phase, whether the mitigation program proposed by the applicant has satisfied this statutory issuance criterion. This finding typically requires consideration of two factors: adequacy of the minimization and mitigation program and whether it is the maximum that can be practically implemented by the applicant.
3. The applicant will ensure that adequate funding for the HCP and procedures to deal with changed circumstances will be provided. The USFWS must ensure that funding sources and levels proposed by the applicant are reliable and will meet the purposes of the HCP, and that measures to deal with unforeseen circumstances are adequately addressed.
4. The taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild. This is a critically important criterion for incidental take permits, because it establishes a fundamental threshold standard for any listed species affected by an HCP. The wording of this criterion is identical to the jeopardy definition under the Section 7 regulations. Congress was explicit about this link. Thus, since the issuance of a Section 10(a)(1)(B) permit is a Federal action subject to Section 7 of the ESA, the law prohibits any non-Federal activity under an HCP from jeopardizing a species under two standards: (1) the Section 7 jeopardy standard; and (2) the incidental take permit issuance criteria. There is one difference between these two standards: the Section 10(a)(1)(B) issuance criteria apply only to listed fish and wildlife species (because listed plants are not protected against take on non-Federal lands), while the jeopardy standard under Section 7(a)(2) applies to plants, as well as animals. However, the practical effect is the same: the ESA requires a no-

jeopardy finding for all affected federally listed species as a precondition for issuance of a Section 10 permit.

5. The applicant will ensure that other measures agreed to with USFWS during the development of the HCP will be included and that these measures may be necessary or appropriate for purposes of the plan. Because the HCP process deals with numerous kinds of actions, measures, and species, this criterion authorizes the USFWS to impose additional measures to protect listed species where deemed necessary. One additional measure that the USFWS may require is the Implementing Agreement. Also, any Section 10 permit issued will be subject to the general permit conditions regarding the display of permits, maintenance of records, and filing of reports.
6. The USFWS has received such other assurances as may be required that the HCP will be implemented. The applicant must ensure that the HCP will be carried out as specified. Compliance with the HCP is a condition of the permit. The authority of the permit is a primary instrument for ensuring that the HCP will be implemented. When developed, Implementing Agreements also provide assurances that the HCP will be properly implemented. Where a local government agency is the applicant, the Agreement should detail the manner in which local agencies will exercise their existing authorities to effect land or water use as set forth in the HCP. Under an HCP, government entities continue to exercise their duly constituted planning, zoning, and permitting powers. However, actions that modify the agreements upon which the permit is based could invalidate the permit. In addition, failure to abide by the terms of the HCP and Implementing Agreement is likely to result in suspension or revocation of the permit. When an HCP involves interests other than the applicant or permittee, the applicant must have specific authority over the other parties affected by the HCP and be willing to exercise that authority, or must secure commitments from them that the terms of the HCP will be upheld. In the latter case, agreements between the USFWS and the other groups, or legally binding contracts between the applicant and such individuals or interests, may be necessary to bind all parties to the terms of the HCP.

1.6 Other Required Actions

Before making a decision regarding the issuance of a permit, the USFWS must comply with the consultation requirements stipulated in Section 7 of the ESA, which require that actions “authorized, funded or carried out” by a Federal agency will not jeopardize the continued existence of, or adversely affect habitat critical to, listed species. A separate biological opinion will be prepared by the USFWS evaluating take allowed under the Section 10(a)(1)(B) permit. No other formal Federal, State, or local permits or approvals are required prior to the decision by the USFWS. However, implementation of the MSCP will require Pima County to obtain a Section 10(a)(1)(A) permit to conduct surveys of

listed species or they must hire a biologist permitted by the USFWS to conduct such surveys of listed species. Pima County may decide to obtain other Federal authorizations or funding to promote avoidance, minimization, or mitigation, but no other Federal actions are required for Pima County to meet its obligations under the Section 10(a)(1)(B) permit.

1.7 Scope of EIS

The scope of this EIS is the evaluation of environmental impacts caused by implementation of the MSCP Covered Activities. The Section 10(a)(1)(B) permit would authorize incidental take of listed species resulting from implementation of the MSCP, including significant impacts and measures to mitigate their effects. Issues and concerns raised through the public involvement and scoping process contributed to the development of the overall scope of this EIS. Refer to Chapter 6 for a detailed discussion of the scoping process. After analyzing the potential for significant effects on the environment, including federally listed species, the USFWS has determined that the following issues should be addressed in this EIS:

- Physical Environment
- Water Resources
- Biological Resources
- Visual Resources
- Air Quality
- Climate Change
- Urban Land Uses
- Transportation
- Ranching and Agriculture
- Cultural and Historic Resources
- Recreation
- Mineral Resources
- Socioeconomic Considerations
- Utility Rights-of-way
- Fire Management
- Environmental Justice

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2.0 Description and Comparison of EIS Alternatives

As required by NEPA, the USFWS has considered a full range of alternatives to issuance of a permit for the proposed MSCP. The development of these alternatives and their various components has been a collaborative effort between USFWS, the applicants, and other interested parties, and has been the focus of community discussions and scientific analyses for more than 10 years.

2.1 Alternatives Considered for Analysis

For this EIS, the USFWS is analyzing the following four alternatives, discussed in further detail, below:

- **Alternative A, No Action Alternative:** Pima County would not apply for, and the USFWS would not issue a Section 10(a)(1)(B) permit for incidental take of listed species in Pima County.
- **Alternative B, Permit for Pima County Activities Only:** the USFWS would issue a Section 10(a)(1)(B) permit for coverage of 44 species that would apply only to certain ground-breaking activities undertaken by Pima County, not to include activities merely permitted by Pima County.
- **Alternative C, Permit for Pima County Activities and All Private Development Activities for which the County Issues Permits:** the USFWS would issue a Section 10(a)(1)(B) permit for coverage of 44 species that would apply to activities that Pima County undertakes, as in Alternative B, including a broad range of activities permitted by Pima County for private development within unincorporated Pima County.
- **Alternative D, Preferred Alternative, Permit for Pima County Activities and Select Private Development “Opt-in” and “Opt-out” Provisions:** the USFWS would issue a Section 10(a)(1)(B) permit for coverage of 44 species that would apply to activities that Pima County undertakes, including certain private development-related impacts, when the property owner elects to participate in the County’s permit. Potential impacts to Covered Species of any individually owned, single lot would be automatically covered when the property owner receives a building permit for 14,000 square feet or more (approximately 1/3 acre), unless the property owner declines to be included (i.e., opt-out). Permit coverage would also be available to developers whose projects are subject to County site construction permit requirements. In these cases, the developer must initiate the request, or opt in, for their development to be included under the County’s permit. The ability to opt in would be determined by

eligibility criteria that include having an approved subdivision plat or a non-residential development where all owners of the area within the limits of disturbance shown in the site construction permit unanimously support the Opt-in Provision application; the 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 MSCP Section 4.5.2.).

Alternatives for the Pima County MSCP were a result of several sets of alternative approaches for a conservation plan that emerged from the public and technical processes to develop the SDCP and to suit Pima County's permitting needs. This process is described in further detail in Section 2.3 below. The consideration of these alternative approaches provided the basis for the Pima County MSCP, as well as the alternatives that the USFWS is analyzing in this EIS. These alternative approaches represent a balance between Pima County's ability to regulate development, a desire to offer permit coverage to privately funded development, and a program for conservation measures.

The most reasonable combined approaches, as guided by the public and technical processes, are analyzed as alternative approaches to address the purpose and need identified in Chapter 1. The differences between the various levels of direct and indirect effects/impacts of Covered Activities on Covered Species helped define the different alternatives.

The fundamental difference between the three action alternatives (i.e., Alternatives B, C, and D) is the type and extent of activities proposed for permit coverage, as described below. The amount of mitigation proposed by each action alternative is commensurate with the location and projected acreage of impact. All three of the action alternatives propose Section 10(a)(1)(B) permit coverage for 44 species (Covered Species; see Chapter 3 for list).

2.1.1 Alternative A, No Action Alternative

Under the No Action Alternative, Pima County would not request, and the USFWS would not issue, a Section 10(a)(1)(B) permit to Pima County. Pima County would continue to implement the Maeveen Marie Behan Conservation Lands System (CLS) and other components of the SDCP. The CLS is described in detail in Chapter 3, Section 3.3.6. Pima County and private developers would be responsible for evaluating each project for ESA compliance requirements on a case-by-case basis. Where there is a Federal nexus, Section 7 consultations for species listed as threatened or endangered under the ESA would be conducted for the project by the Federal agency issuing a permit or funding. Where a Federal nexus does not exist, neither Pima County nor developers would have relief from Section 9 liability, except through development of a habitat conservation plan specific to their project. This alternative is the current situation in Pima County.

2.1.1.1 Affected Area

The No Action Alternative would affect all of unincorporated Pima County and other Pima County-owned lands. The remainder of Pima County would also be indirectly affected, with the absence of a regional-scale habitat conservation framework for dealing with listed species or other biological resources.

2.1.1.2 Permit Area

Rather than pursuing one single permit, individual permits could be sought for areas of various sizes and locations throughout Pima County, each covered by an individual Section 10(a)(1)(B) permit or Section 7 consultation.

2.1.1.3 Level of Take

Section 9 of the ESA makes it unlawful for anyone to “take” a listed animal, and this includes significantly modifying its habitat. Section 9 applies to private parties and private land; a landowner may not take an endangered or threatened animal or its habitat on his/her property without authorization. Both Section 7 and Section 9 authorize “incidental take” of threatened and endangered species. Under Section 10 of the ESA, a permit for “incidental take” of listed species may be issued for non-Federal activities that are incidental to and not for the purpose of a proposed activity. Section 10 requires the submittal of a Habitat Conservation Plan.

USFWS regulatory purview is limited to activities where a discretionary action that is authorized, funded, or carried out by a Federal agency (e.g., Clean Water Act Section 404 permit for dredging and filling waters of the United States) may affect a listed species or non-Federal actions that may result in take of listed animals. Take of species listed at the time of the Section 7 consultation would receive mitigation, as well as any species covered within individual habitat conservation plans and associated Section 10(a)(1)(B) permits. Impacts to unlisted species would be avoided and minimized through the SDCP, but habitat losses would not be mitigated. The No Action Alternative would not provide conservation for federally listed species. Take for private actions without a Federal nexus could be covered under individual permits for project-based habitat conservation plans under Section 10 of the ESA and the issuance of individual incidental take permits for each project or by individual consultation on a project-by-project basis.

2.1.1.4 Cost and Funding

Pima County’s implementation of mitigation or conservation measures would be tied to individual projects or activities and would be independently funded on a project-by-project and species-by-species basis. Funding for monitoring and management of

individual species and for mitigation lands would be required on a case-by-case basis through individual Section 10(a)(1)(B) permits or through Section 7 consultations.

2.1.2 Alternative B, Permit for County Activities Only

Under Alternative B, the USFWS would issue a Section 10(a)(1)(B) permit to Pima County for 44 species. Permit coverage would apply only to activities that the County undertakes, such as:

- Capital Improvement Program projects (list provided in Appendix E of the MSCP);
- Activities of Pima County and RFCD including construction, repair, and maintenance and operation of County facilities and infrastructure (RFCD construction and maintenance activities may occur in areas that typically require Army Corps of Engineers review and approval under Section 404 of the Clean Water Act. These activities are detailed in the MSCP Section 3.4.1.2.);
- Activities associated with the duties and operations of all Pima County departments (e.g., Sheriff; Transportation; Cultural and Historic Preservation; Regional Water Reclamation; and Natural Resources, Parks and Recreation) and the activities of the RFCD, inclusive of alterations to federally mapped floodplains. The RFCD intends that its watercourse maintenance activities covered in the existing Clean Water Act, Section 404, Regional General Permit 81 are Covered Activities under Alternative B;
- 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 Pima County rights-of-way required by Pima County;
- Recreation authorized by Pima County;
- Mosquito control for public health;
- Monitoring and management activities including surveys, scientific studies, and other such activities carried out by Pima County and its cooperators;
- Restoration activities such as vegetation treatments (including wildland fire) that are intended to improve the biological and ecological values;
- Recreation activities authorized by Pima County; and
- County ranch-management activities—exclusive of livestock herbivory and trampling—on land owned by Pima County and lands managed by the County through grazing leases (see MSCP Section 3.4.1.2). Some of these activities may occur outside of Pima County on ranch lands owned by the County and classified as mitigation lands.

Private development applicants within Pima County would continue to be responsible for individual Section 7 consultations or development of individual habitat conservation plans and associated incidental take permits as applicable. Pima County would continue incorporating measures in existing ordinances and other administrative tools outlined in the SDCP. The SDCP can be found on the Pima County website at <http://www.pima.gov/cmo/sdcp/>.

Under Alternative B, avoidance, minimization, and mitigation measures would also be included as part of Section 10(a)(1)(B) permit, commensurate with the level of impacts associated with the Covered Activities, which would be lower than those covered under Alternatives C and D. Details of these measures are found in Chapter 4 of the Pima County MSCP. Mitigation measures are also discussed in Chapter 4, Environmental Consequences, of this EIS.

2.1.2.1 Affected Area

Only those lands that Pima County owns, leases, or constructs projects upon would be directly affected. This alternative would exclude private land development.

2.1.2.2 Permit Area

The Permit Area would include those areas of the County where capital improvement projects take place and those lands that are owned or leased by Pima County. This Permit Area would be a subset of the lands that are proposed for coverage under Alternatives C and D described below.

2.1.2.3 Level of Take

Under Alternative B, the level of take would be based on Pima County activities covered under the Section 10(a)(1)(B) permit, which include Capital Improvement Program, ranch management, and operations and maintenance activities. Under this alternative, modeling efforts suggest that Covered Activities would result in approximately 2,500 acres of ground disturbance, with the majority of disturbance occurring within CLS lands. The majority of these lands are within unincorporated Pima County; however, ground disturbance would also occur in areas outside the County as a consequence of authorized activities, primarily ranching and recreation, on County-owned mitigation lands.

The status quo model used to determine potential disturbance within CLS lands was based on continuing the geographic distribution of development established by prior land use actions. Subdivision plats located within CLS lands reflect entitlements to build and it was assumed, for modeling purposes and worst case scenario, that these subdivisions could be built within the 30-year term of the 10(a)(1)(B) permit period.

Modeled mitigation requirements for the acres of ground disturbance would be approximately 7,900 acres. Due to the uncertainties of future development needs, Pima County has capped the covered activity impacts to 5,000 acres under Alternative B with corresponding mitigation of approximately 16,000 acres.

Based on the number of acres of disturbance and mitigation required, it is anticipated that the level of take under Alternative B would be low to moderate. Of the three action alternatives, this alternative would result in the lowest level of take that would be covered by the permit. Mitigation would be coordinated for all covered projects, whether or not a Federal nexus would have existed, independent of the Section 10(a)(1)(B) permit (MSCP Chapter 4). Unlike Alternative A, effects of covered projects on the 44 species discussed in the MSCP would be mitigated.

2.1.2.4 Cost and Funding

The scale of the monitoring and management programs would be commensurate with the scale of the covered impacts. Under this alternative, Pima County would focus management and monitoring on approximately 16,000 acres of mitigation lands, which have already been acquired. Funding for regional-scale monitoring and management would not be required as it would under Alternatives C and D. No fees would apply to the private sector, because there is no private-sector coverage under this alternative.

2.1.3 Alternative C, Permit for County Activities and All Private Development Activities for which the County Issues Permits

Under Alternative C, the USFWS would issue a Section 10(a)(1)(B) permit to Pima County to cover activities that Pima County undertakes (as in Alternative B), as well as free and automatic coverage to all private development within unincorporated Pima County for which Pima County issues a development-related permit. Alternative C covers the broadest range of Covered Activities that would result in take (see MSCP Section 3.4). Under this alternative, the need for separate Section 7 consultations or individual habitat conservation plans would be reduced or eliminated, because consultation would be covered under the Pima County MSCP at a regional scale. All Pima County-permitted private development in unincorporated Pima County would have relief from Section 9 liability under the County's Section 10(a)(1)(B) permit.

Under Alternative C, avoidance, minimization, and mitigation measures would also be included as part of the Section 10(a)(1)(B) permit, commensurate with the level of impacts, which would likely be the highest of all alternatives. Details of these measures are found in Chapter 4 of the Pima County MSCP. Mitigation measures are also discussed in Chapter 4, Environmental Consequences, of this EIS.

2.1.3.1 Affected Area

Lands that Pima County owns, leases, or constructs projects on would be directly affected, as would all private lands in unincorporated Pima County. The affected area would be the largest of all alternatives.

2.1.3.2 Permit Area

The Permit Area would be as follows: (1) all of unincorporated Pima County; (2) lands where construction and maintenance of Pima County infrastructure occur, including lands within the cities and towns of Tucson, Marana, Oro Valley, and Sahuarita, and adjacent counties; (3) State Trust lands that are or would be leased by Pima County or used as road easements; (4) State Trust and U.S. Bureau of Land Management (BLM) lands that could be released to the private sector and thus become subject to regulatory control of Pima County; (5) State Trust lands where Pima County holds a lease or acquires the land in fee; and (6) BLM lands which Pima County might purchase or lease for open-space purposes either through the Recreation and Public Purposes Act (RPPA) or through land exchanges.

Pima County intends to use the RPPA to purchase or lease certain tracts of land currently managed by BLM. Currently, most Pima County RPPA applications pertain to properties either adjacent to Tucson Mountain Park or near Tortolita Mountain Park. If Pima County purchases or leases RPPA land managed by BLM, Pima County would commit the use of the undeveloped lands 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-purchased or leased lands would be legally protected via a reversionary clause, which would revert ownership to the BLM if the lands should ever be used for purposes other than open-space protection. Pima County will claim full credit under the MSCP for protecting, managing, and monitoring the identified RPPA lands.

2.1.3.3 Level of Take

Under Alternative C, activities covered under the Section 10(a)(1)(B) permit would include activities Pima County undertakes (as described in Alternative B) and all private development within unincorporated Pima County for which Pima County issues a development-related permit. Under this alternative, Covered Activities would result in approximately 111,400 acres of ground disturbance, with the majority of disturbance occurring within CLS lands. The majority of these lands are within unincorporated Pima County; however, ground disturbance would also occur in areas outside the County as a consequence of authorized activities, primarily ranching and recreation, on County-owned mitigation lands.

The status quo model used to determine potential disturbance within CLS lands was based on continuing the geographic distribution of development established by prior land use actions. Subdivision plats located within CLS lands reflect entitlements to build and it was assumed, for modeling purposes and worst case scenario, that these subdivisions could be built within the 30-year term of the 10(a)(1)(B) permit period.

The mitigation requirement for the acres of ground disturbance would be permanent protection of approximately 252,000 acres, which is the number of mitigation acres based on the CLS mitigation guidelines for private development. Based on the number of acres of disturbance and the mitigation requirement, it is anticipated that the level of take under Alternative C would be moderate to high. Of the three action alternatives, this alternative would result in the highest level of take that would be covered by the permit. The total amount of mitigation would also be greater than other alternatives. Mitigation would be coordinated for all Covered Activities. Effects to all 44 species discussed in the MSCP would be mitigated (MSCP Chapter 4).

2.1.3.4 Cost and Funding

Under this alternative, there would be no fee to the private sector. The scale of the monitoring and management programs would be commensurate with the scale of the covered impacts. Under Alternative C, Pima County would focus management and monitoring on the approximately 252,000 acres of mitigation lands. Funding for regional-scale monitoring and management would be required, with the monitoring program being approximately 2.5 times the estimate for Alternative D. Assuming the mitigation ratios that are proposed in Pima County's MSCP are carried forward to this alternative, the cost of the mitigation commitment—beyond the amount already spent—could exceed \$292 million¹. The funding source for acquiring additional lands would be the use of general obligation bonds supplemented with allocations from the RFCD's tax levy.

¹Cost per acre is calculated as the average cost per acre of land that Pima County has paid since 2004 to satisfy the future mitigation requirements of the Section 10 permit (\$2,000/acre, a figure that includes fee-title lands and leased lands, which were discounted to 25 percent of the value of the fee lands). Based on a figure of approximately 146,000 acres of additional mitigation lands required under this alternative, it would cost Pima County an additional \$292 million (i.e., 146,000 acres multiplied by \$2,000/acre).

2.1.4 Alternative D (Preferred Alternative), Permit for County Activities and Private Development Activities for Board of Supervisor-approved Rezoning and an Opt-in Provision

Under the Preferred Alternative (Alternative D), the USFWS would issue a Section 10(a)(1)(B) permit for County activities that Pima County undertakes (as in Alternative B) and would also include the following activities on private property:

- Ground disturbances subsequent to Pima County's issuance of a building permit that authorizes grading of 14,000 square feet or more on individual single-dwelling lots, provided that the property owner agrees, at the time they apply for a building permit, that the County may include the ground disturbance 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 agrees that the County may include the ground disturbance in the County's Section 10 permit. The property owner may only declare their consent during the time period between the submittal of the site construction permit application and issuance of the site construction permit (see MSCP Section 3.4.1.1); and
- Ground disturbances that occur as part of—and subsequent to—the development of a non-residential facility where development is 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 (additional details below).

Pima County proposes to provide Section 10 permit coverage to private development-related disturbances within the Permit Area. Permit coverage would be available through one of two methods, as described below. The County would grant permit coverage for development on private property on a first-come-first-served basis and until the development cap described below is met.

2.1.4.1 Coverage for Individual Single-dwelling Residential Lots

Pima County would 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 would, 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 confirms that coverage and mitigation have been previously provided for the individual single-dwelling residential lot, the property owner can no longer exercise 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 an 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 would 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 would be issued to the property owner at the time they receive their building permit. Once inspection by County staff confirms that grading, in fact, occurred, Pima County would provide mitigation, as necessary.

Pima County would provide coverage for the entire parcel the first time a building permit is issued in instances where the property owner elects not to opt out. This strategy provides certainty to the property owner, as well as Pima County, that the planned disturbance and any potential future disturbance would be fully mitigated.

2.1.4.2 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 could 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 would protect against unlawful take that may result from grading and development authorized by the site construction permit. The opportunity to opt in would be available when 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 (as described in the MSCP).

The County would also require those natural open-space areas created for compliance with the CLS conservation guidelines and *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 would require those 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 would issue a Certificate of Coverage. Other details of this coverage include:

- Pima County would 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, in fact, occurred, Pima County would provide mitigation, as necessary.
- GIS polygons would be used to track acres of grading and ground-disturbance impacts as well as acres reserved as mitigation lands, where appropriate.

The total number of acres of Covered Activities would be capped at 36,000 acres under Alternative D. The County would reserve approximately 5,000 acres to cover Pima County activities (as described above) with the remaining 31,000 acres allocated for ground disturbance caused by private sector development on a first-come-first-served basis. This alternative is intermediate between Alternatives B and C in the sense that it includes privately owned properties and would require a fee for these lands to gain access to the benefits of the permit.

Under Alternative D, avoidance, minimization, and mitigation measures would also be included as part of the Section 10(a)(1)(B) permit, commensurate with the level of impacts of this alternative, which would likely be greater than those of Alternative B, but less than Alternative C. Details of these measures are found in Chapter 4 of the Pima County MSCP. Mitigation measures are also discussed in Chapter 4, Environmental Consequences, of this EIS.

2.1.4.3 Affected Area

The affected area would be the same as for Alternative C, but the total number of acres that would be covered under the permit would be capped at 36,000.

2.1.4.4 Permit Area

The Permit Area would be the same as described for Alternative C.

2.1.4.5 Level of Take

Under the Preferred Alternative, activities covered under the Section 10(a)(1)(B) permit would include activities that Pima County undertakes (as described in Alternative B), as

well as some private-sector activities. Under this alternative, modeling efforts suggest that Covered Activities would result in approximately 36,000 acres of ground disturbance, with the majority of disturbance occurring within CLS lands. These 36,000 acres would be Pima County's cap for covered activity impacts. The majority of these lands are within unincorporated Pima County; however, ground disturbance would also occur in areas outside the County as a consequence of authorized activities, primarily ranching and recreation, on County-owned mitigation lands.

The status quo model used to determine potential disturbance within CLS lands was based on continuing the geographic distribution of development established by prior land use actions. Subdivision plats located within CLS lands reflect entitlements to build and it was assumed, for modeling purposes and worst case scenario, that these subdivisions could be built within the 30-year term of the 10(a)(1)(B) permit period.

Modeled mitigation requirements for the acres of ground disturbance would be permanent protection of approximately 116,000 acres.

Based on the number of acres of disturbance and the mitigation requirement, it is anticipated that the level of take under the Preferred Alternative would be moderate. Of the three action alternatives, this would be intermediate in the level of take that would be covered under the permit. Consequently, the mitigation requirements for this alternative would be intermediate as well. Mitigation would be coordinated for all Covered Activities. Effects to all 44 species discussed in the MSCP would be mitigated (MSCP Chapter 4).

2.1.4.6 Cost and Funding

The scale of the monitoring and management programs would be commensurate with the scale of the covered impacts. Under the Preferred Alternative, Pima County would focus management and monitoring on the approximately 116,000 acres of mitigation lands. Funding for large-scale monitoring and management would be required and would be provided through the County's General Fund. The cost of the mitigation commitment, beyond the amount already spent, could be approximately \$20 million². Acquisition costs would be funded by general obligation bonds, coupled with occasional allocations from the RFCD. Private-sector development via plats and plans would pay an application fee,

²Based on the cost per acre of approximately \$2,000, the 9,900 acres of additional mitigation lands required under this alternative would cost Pima County approximately \$19.8 million (i.e., 9,900 acres multiplied by \$2,000/acre).

and a management and monitoring fee under the County’s “fee for service” authority. The management and monitoring fee would only apply to CLS set-aside monitoring.

2.2 Comparison of EIS Alternatives

The three action alternatives would result in USFWS issuance of a Section 10(a)(1)(B) permit, while the No Action alternative would not. All alternatives would result in Pima County’s implementation of the CLS through application of the Pima County Comprehensive Plan. The action alternatives do not differ in the list of species covered by the permit. The most important difference among alternatives is the extent and type of activities covered and amount of monitoring, management, and mitigation required to offset associated impacts. Although the SDCP provides temporary protection for these lands, the MSCP would formalize and institutionalize those conservation commitments in the form of conservation easements and other land protection measures. In addition, the scope of the management and monitoring plan would change among the alternatives. The management and monitoring plan for Alternative B (i.e., permit for Pima County activities only) would be smallest in scope. Conversely, the largest management and monitoring effort would be required under Alternative C, with Alternative D being intermediate. The management and monitoring effort for all three of these alternatives is commensurate with anticipated impacts and the scale of the mitigation program for that alternative.

Table 2.1 provides a summary comparison of all alternatives.

**TABLE 2.1
COMPARISON OF ALTERNATIVES**

Issue/Action	Alternative			
	A	B	C	D (Preferred)
Issue 10(a)(1)(B) Permit	No	Yes	Yes	Yes
Implementation of the CLS (SDCP)	Yes	Yes	Yes	Yes
Pima County Stewardship of ranch land leased from State Land Department used for Mitigation Credit	No	No	Yes	Yes
Coverage of Pima County activities	No	Yes	Yes	Yes
Coverage of Private Development Activities	No	No	Yes, all	Yes, subset
Need to Acquire Additional Mitigation Lands in addition to Those Already Acquired	No	No	Yes, substantial	Yes, potentially minimal
Coordinated Mitigation for all 44 Species	No	Yes	Yes	Yes
Acres of Covered Activities	0	5,000	111,300	36,000
Acres of Mitigation Requirement*	0	16,000	252,000	116,000

*Alternatives have varying mitigation ratios, these are: Alternative A, none; Alternatives B and D, highest ratio; Alternative C, lowest ratio (as described in the MSCP).

CLS = Maeveen Marie Behan Conservation Lands System

SDCP = Sonoran Desert Conservation Plan

2.3 Alternatives Eliminated from Further Consideration

In the many years of scoping for this EIS, a number of alternatives were discussed, but not considered in further detail because they either: (1) did not meet the USFWS's purpose and need for issuing a Section 10(a) permit, (2) did not achieve conservation envisioned by the Science Technical Advisory Team (STAT), (3) were not within the control of the applicant, (4) did not meet the applicant's specific needs, or (5) were otherwise considered infeasible. These alternatives and the reasons for elimination from further consideration are shown in Table 2.2 below.

**TABLE 2.2
EIS ALTERNATIVES CONSIDERED BUT REJECTED**

Alternative	Reason for Elimination
Issue a Sonoran Desert ecosystem-wide permit including counties in California, Arizona, and, potentially, northern Mexico.	Getting widespread agreement was considered infeasible by the applicant.
Issue a single species permit for the pygmy-owl.	Coverage for one species did not meet applicant's needs.
Issue a permit covering only species listed as threatened and endangered.	Significant potential for additional listings means it does not meet applicant's needs.
Issue a permit covering grazing.	Coverage of private grazing was rejected by the Steering Committee and since the County has no discretionary authority, coverage would be prohibited by USFWS. Coverage of County grazing was rejected for reasons described in the Draft MSCP (Chapter 3).
Issue a permit covering a different set of PVS.	In 2003, Steering Committee supported protection of habitat for all 55 species. Merits of covering each PVS were discussed at length by the STAT in 2005–2006. STAT did not recommend coverage for all PVS and staff have since adjusted species based on updated information about distribution of species and potential for take by Covered Activities.
Issue a multiple species permit covering the County, the incorporated cities within the County, and State Trust lands.	Applicant considered this alternative infeasible given expressed lack of interest from municipalities and the accommodation given to State Trust lands in the County's preferred alternative.
Issue a permit requiring mitigation using only lands owned by Pima County or private (non-Federal, non-State lands) via fee acquisition.	As there is insufficient private land in Pima County to cover all impacts and to be able to mitigate with only private land, the STAT recommended a reserve system that extended across jurisdictional boundaries.
Issue a permit requiring mitigation using only private lands via conservation easements.	Pima County would not be able to get enough conservation easements in Pima County using this strategy, because these must be voluntary.

**TABLE 2.2
EIS ALTERNATIVES CONSIDERED BUT REJECTED**

Alternative	Reason for Elimination
Issue a permit with the participation of other jurisdictions as signatories to all or a select subset of the proposed minimization and mitigation strategies in addition to conservation, management, and monitoring.	Other jurisdictions were either not interested in signing onto Pima County's permit or began developing their own habitat conservation plan.
Issue a permit requiring a monitoring strategy limited to monitoring of populations of species.	STAT rejected this alternative and recommended a multi-level monitoring strategy before and concurrent with the 2006 application for a USFWS grant to support monitoring plan development. The County chose to go with a multi-level approach consistent with earlier STAT recommendations.
Private coverage is limited to rezonings.	The private sector, USFWS and local and environmental leaders support broader coverage of private-sector activities, especially for development, which is already entitled. Also, rezonings may take years before they are developed.

MSCP = Multi-species Conservation Plan
PVS = Priority Vulnerable Species
STAT = Science Technical Advisory Team
USFWS = U.S. Fish and Wildlife Service

2.4 MSCP Summary

The process used to formulate MSCP alternatives merged input from citizens, planners, and other agency representatives (public process) with the conservation reserve design process that was overseen by the STAT (technical process). Out of this came the SDCP, a locally adopted plan, as well as the intention to obtain a Section 10(a)(1)(B) permit through development and implementation of a MSCP. The Pima County MSCP is a conservation plan based on the reserve design process, which resulted in the CLS.

A hallmark of the conservation planning effort has been broad participation by many agencies, organizations, and interested citizens. Representatives of local jurisdictions, State and Federal agencies, and Tribes have participated in meetings, on committees, and as members of the STAT and Government Working Group of agency representatives. Their contributions and concerns have been made part of the reserve design and conservation planning process.

The collection and synthesis of biological data have been ongoing in Pima County for many years, with formal scientific records dating back to the 1800s and extending into the present to reflect agency, academic, and private sector efforts. This information provides a broad historical context for examining existing conditions.

The focused efforts of scientists working on the Pima County MSCP began with the Pima County's formation of the STAT and appointment of STAT members by the Pima County Board of Supervisors (BOS) to oversee development of the MSCP—the biological resources component of the SDCP (see list of STAT members in MSCP Chapter 9, Reporting and Public Participation).

In May 1999, the STAT met to begin discussions regarding the biological underpinnings for a regional conservation plan with full participation and guidance by the USFWS. Since that time, STAT and County staff—along with consultants, other biologists, and natural resource managers—have identified the plant and wildlife species of greatest concern, identified mapping and data gathering needs, participated in GIS decision-making workshops, overseen the reserve design process that generated the CLS (discussed below), and identified monitoring and management principles for long-term viability of the proposed conserved lands. The result of this process, detailed in an extensive series of technical documents (see Chapter 8, References Cited), forms the basis for the proposed Pima County MSCP. This process is briefly discussed below and is described in greater detail in the Pima County MSCP (Pima County 2016) and other planning documents (e.g., Fonseca et al. 1999; Pima County 2000a, 2001a; RECON Environmental, Inc. [RECON] 2000a, 2001).

2.4.1 Habitat Analysis and Species Distributions

As part of the scientific basis for determining a reserve design for the Pima County MSCP, the STAT, consultant team, and species experts compiled information on species' requirements and conducted habitat analysis and mapping for 55 species, known in the early planning stages of the SDCP as the Priority Vulnerable Species (PVS; Pima County 2001a). These species formed the biological basis for the CLS, Pima County's biological reserve system. Upon close examination of the PVS regarding the need for an incidental take permit (i.e., Section 10 permit), Pima County eliminated six species and determined that 5 species would not be affected by Pima County activities. The remaining 44 species are referred to in the Pima County MSCP as the proposed Covered Species.

2.4.2 Reserve Design Process

The foundation for the reserve design process was the multitude of layers of GIS data relating to both natural and built environments in Pima County. The process of designing the reserve system for Pima County evolved with the incorporation of input from the iterative review process. The reserve design approach developed by STAT and RECON was founded on the principles of conservation biology applied to the particular species and the environmental concern in Pima County (RECON 2000b, 2001). Overlay analysis in GIS provided the basis for building the component layers and ultimately the reserve design. The biologically preferred alternative reserve system was developed based on

biological value as assessed by the STAT in cooperation with many species experts. The major components in determining biological value were as follows:

- Models of potentially suitable habitat of 41 PVS (RECON 2000a)
- Other Special Elements (physical features, vegetation communities) identified by STAT (Fonseca and Connolly 2002)
- Expert-defined Priority Conservation Areas (Pima County 2001b) for most PVS
- Special Species Management Areas for cactus ferruginous pygmy-owl, Mexican spotted owl (*Strix occidentalis lucida*), and southwestern willow flycatcher

The biological value mapping was founded upon data layers representing species richness (i.e., number of species) of PVS, a representation of the biological diversity of Pima County (Pima County 2001c). The initial assessment was based on the distribution of high and medium potential modeled habitat. Areas of higher species richness—places where three or more species have overlapping high potential habitat—provided the starting point for drawing the initial reserve system boundaries (Figure 2.1).

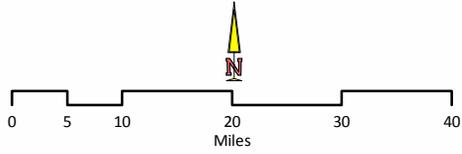
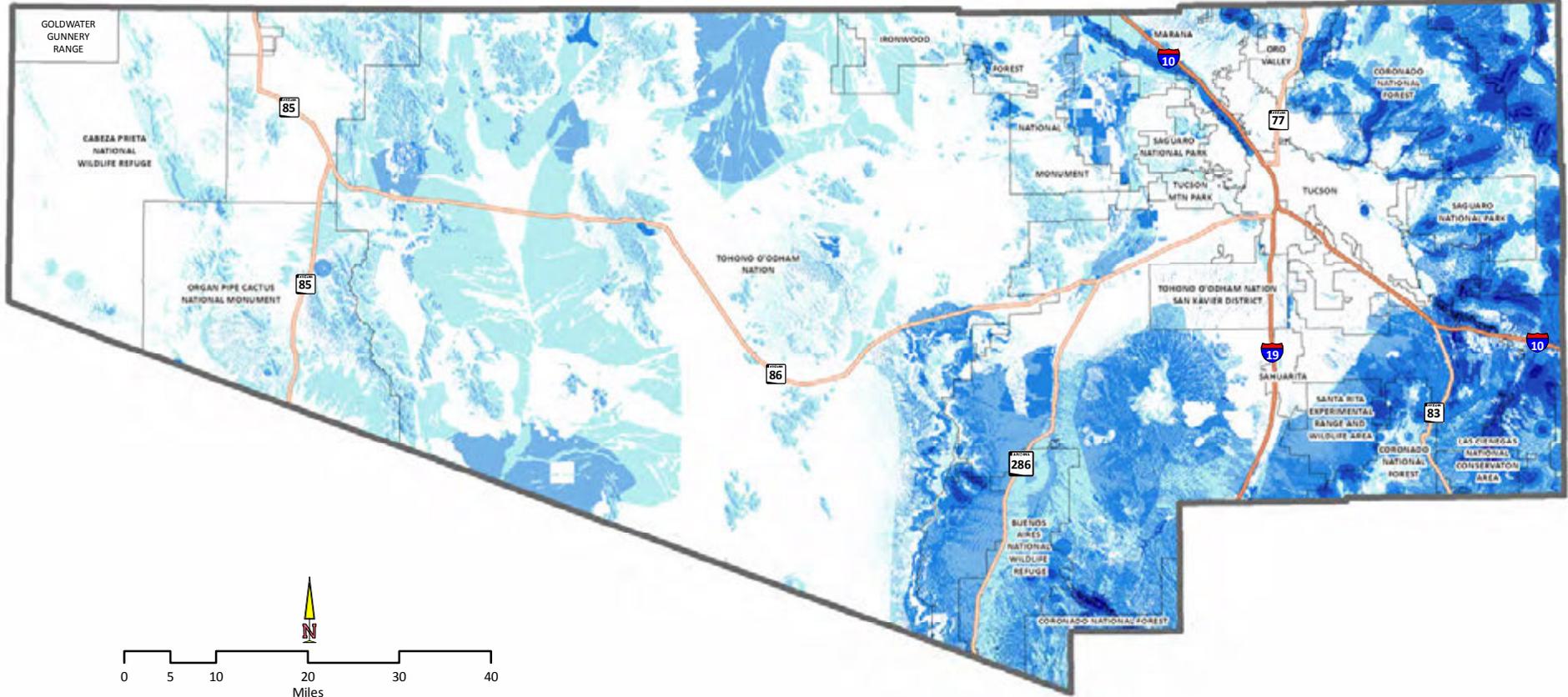
2.4.3 Initial Reserve System

The Initial Reserve System boundaries were delineated based on a set of rules developed by STAT, guided by principles of reserve design. Using the reserve design rules and principles in an iterative process (Figure 2.2), the STAT and consultant team—with assistance from Pima County staff and with participation by USFWS—developed a “biologically preferred alternative” reserve configuration, which later became known as the CLS (Figure 2.3). This configuration represents a reserve system with the potential to meet the goals of conservation of the full range of biological resources in Pima County, as well as meeting the requirements of Section 10(a)(1)(B) for most, if not all, of the proposed Covered Species. This reserve system configuration was adopted by the Pima County BOS in the 2001 Comprehensive Plan Update (Pima County BOS 2001).

2.4.4 Input from the Steering Committee and STAT

In their final report, approved by the Pima County BOS in June 2003, the SDCP Steering Committee considered a number of issues associated with the scope and coverage of the Section 10(a)(1)(B) permit applications (Pima County 2003). These issues related to the duration of the permit, entities and projects to be covered by the MSCP, and species to be covered by the permit. Among the steering committee’s recommendations were that:

- Pima County apply for a permit with a term of 20 to 50 years;



Scale 1:1,000,000 12/24/09

Note: Analysis selected high potential habitat layers from the 34 species models in the 2008/2009 analyses.

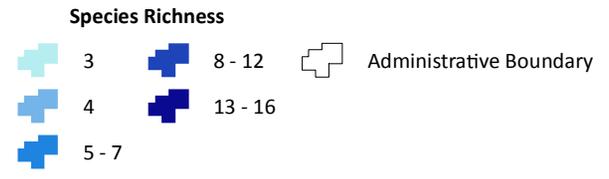


Figure 2.1
Areas of High Biological Value

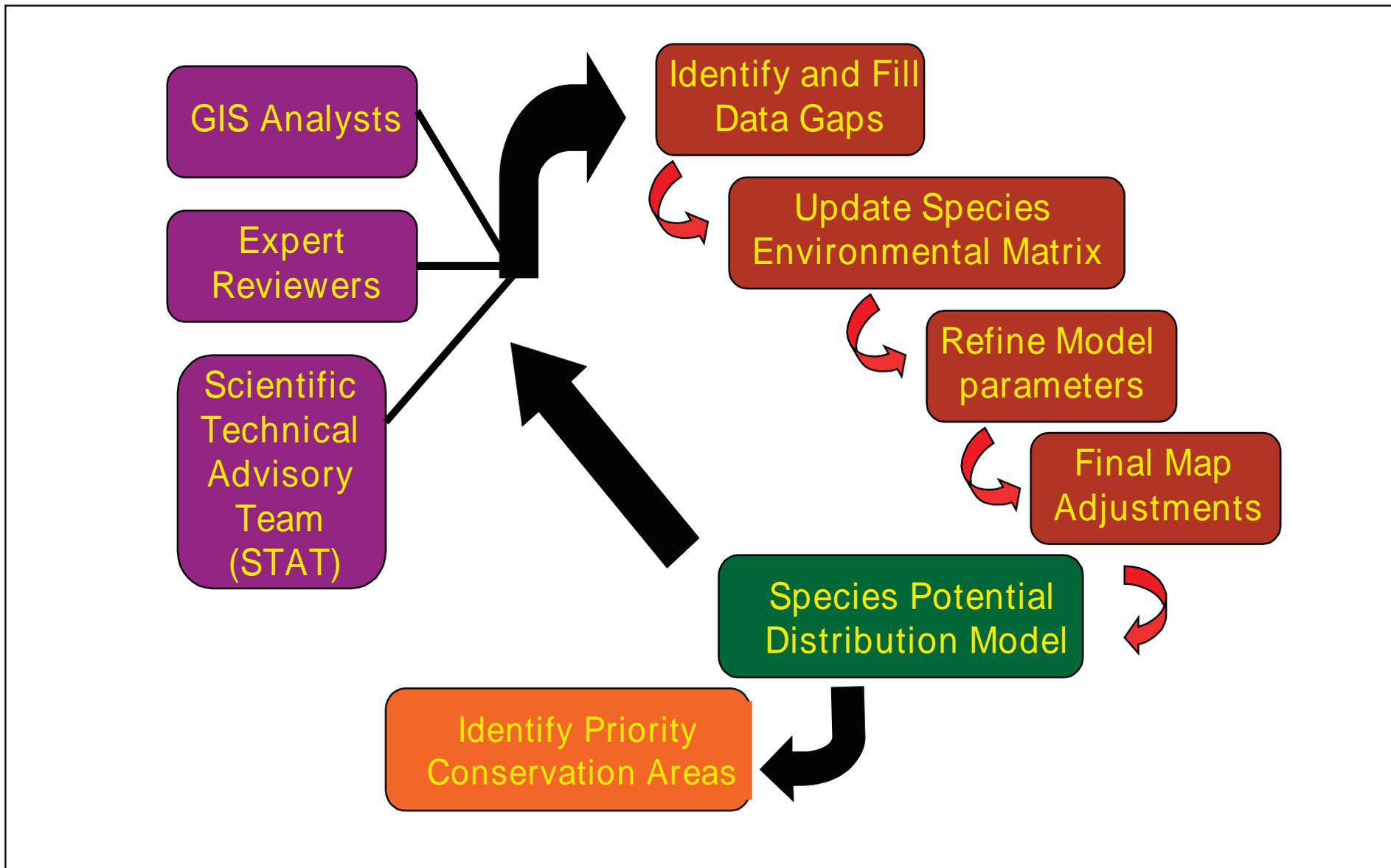
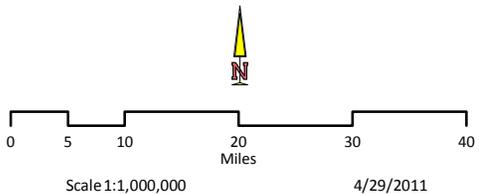
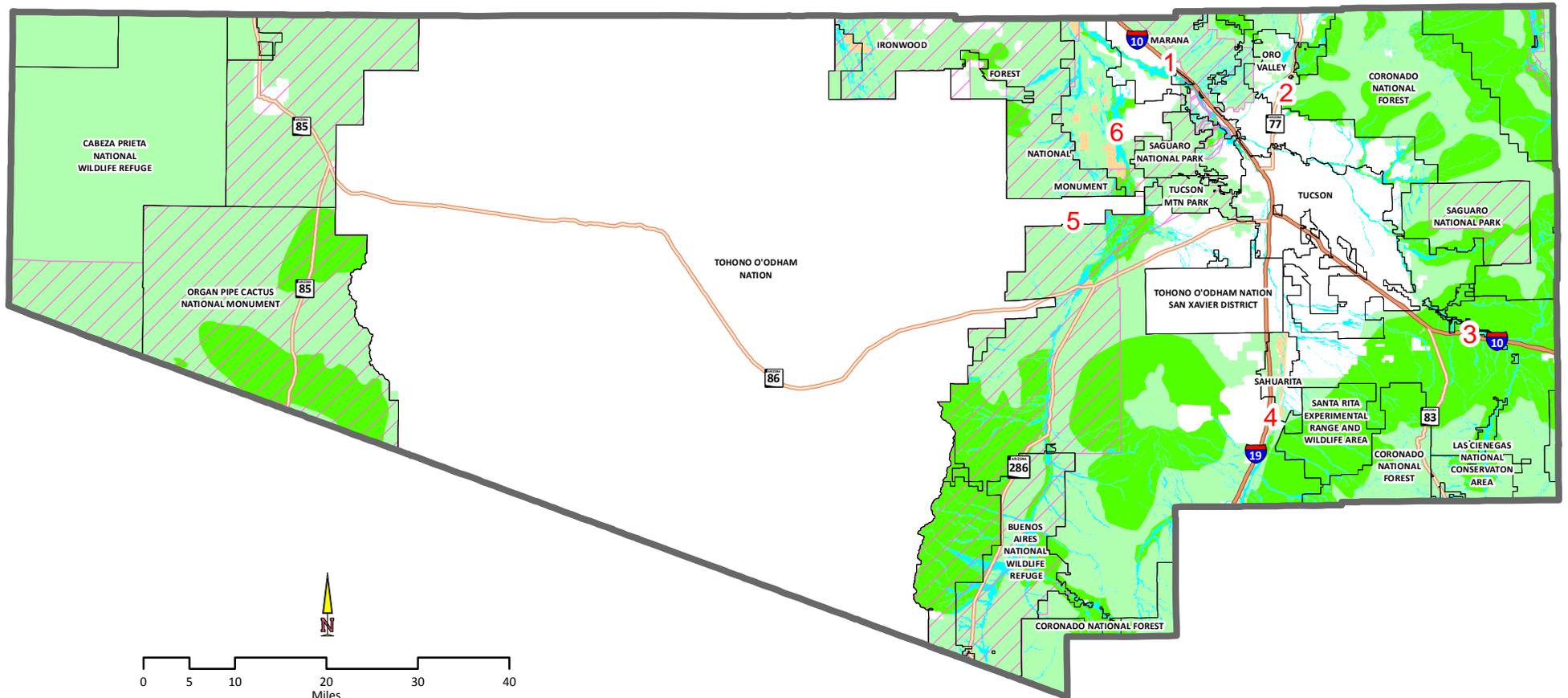


FIGURE 2.2
Reserve Design Process Diagram



- | | | | |
|---|---------------------------------|---|----------------------------------|
|  | Administrative Boundary |  | Multiple Use Management Area |
|  | Important Riparian Area |  | Agriculture Inholding Within CLS |
|  | Biological Core Management Area |  | Special Species Management Area |
| Note: Area in white is outside MMBCLS. | |  | Critical Landscape Connection |

Figure 2.3
Maeveen Marie Behan
Conservation Lands System

- the Section 10(a)(1)(B) permit application cover all relevant County projects and permits, and willing entities within the County;
- Pima County adopt the ecosystem approach that resulted in the CLS map;
- the MSCP clearly describe and analyze alternatives based on the following:
 - Covered Species and the conservation measures enacted for their protection;
 - the species listed as threatened and endangered in Pima County, plus those that would be adequately addressed by the conservation measures enacted for the species;
 - a combination between the listed species only and 55 PVS species;
 - the species within the 55 PVS that are currently listed as threatened and endangered or are candidates for listing; and
 - the No Action Alternative, as required by law; and
- STAT provided a number of important recommendations regarding the implementation of the monitoring program, specifically recommending that Pima County monitor a broad range of ecosystem features (e.g., species, vegetation, water, climate, and land cover change) and not focus solely on monitoring individual Covered Species (Shaw 2006).

2.4.5 Additional Public Input

In the 2008 MSCP draft, Pima County proposed to narrow the scope of private lands coverage to rezonings. During an extensive public process in 2009, Pima County heard some concern regarding the extent of coverage and the monitoring plan. A revised administrative draft MSCP was submitted to the USFWS in 2010, which extended private lands coverage to grading permits, plats, and plans, and also provided a revised monitoring plan.

2.4.6 Similarity among Alternatives

All MSCP alternatives assume the continued implementation of the CLS, as adopted in the Pima County Comprehensive Plan. Each MSCP alternative incorporates the projected development scenarios resulting from the community growth model that is detailed in Appendix G of the Pima County MSCP. All alternatives assume the continued funding of management, conservation measures, and other funding priorities that promote the SDCP biological goal. Alternatives may include open-space acquisitions above and beyond that which occurred subsequent to the voter-approved Bond Initiative in May 2004. Finally, all MSCP alternatives would benefit from—but not rely upon—the cooperation of other jurisdictions, Federal and State government agencies, Tribes, and non-profit organizations to achieve goals and objectives.

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3.0 Affected Environment

3.1 Physical Environment

This section discusses the physical environment of Pima County and is divided into three sub-sections: Physiography, Geology, and Soils; Elevation and Drainage; and Climate.

3.1.1 Physiography, Geology, and Soils

Pima County, in southern Arizona (Figure 3.1), lies within the Basin and Range physiographic province (Figure 3.2). Throughout this province, mountains tend to be relatively long, rugged, low, and widely scattered. They are semi-parallel, trending northwest/southeast. Igneous, sedimentary, and metamorphic rocks are all present. Granitic and metamorphic rocks produce mountain landforms with jagged crests that slope away from the high points. The Baboquivari Mountains and Pusch Ridge at the west end of the Catalina Mountains exhibit this typical structure. The volcanic mountains, such as Black Mountain and those in the Tucson and Ajo mountains, have a more rounded appearance or have even, flat crests and much darker surface colors due to the presence of rhyolite and basalt (Fenneman 1993). Shallower, rockier soils are prevalent in the low hills and mountain foothills. Rock outcropping is common in these areas.

Prospecting and mining for copper, silver, and other minerals have been and continue to be important land-use activities that have shaped the landscape, development and economy of the area. The primary landform change resulting from past and current mining activities is the presence of large open pit mines in the areas of Ajo, Silver Bell Mountains, Santa Rita Mountains, and Green Valley. Smaller and often isolated areas of surface disturbances related to mining also occur throughout Pima County in mid- to high-elevation areas.

Limestone is quarried northwest and south of Tucson, in the Twin Peaks area and at the north end of the Santa Rita Mountains. The presence of limestone in the Rincon and Santa Rita mountains has resulted in numerous caves, most notably Colossal Cave. These caves provide a unique habitat for native wildlife, such as the Arkenstone cave pseudoscorpion (*Albiorix anophthalmus*) and several bat species.

Valley basins between mountain ranges are broad and gently sloping, filled with gently graded debris from the adjacent mountains. Most of these valleys have a deep alluvial soil structure. Over time these valleys have been filled with thousands of feet of water-bearing layers of gravel, sand, and clay beds. These are the alluvial containers of desert aquifers (Richardson and Miller 1974; Chronic 1983; Scarborough 2000).



FIGURE 3.1
Pima County in Southern Arizona



 Basin and Range Province

FIGURE 3.2
Pima County within Basin and Range
Physiographic Province

In some areas, such as the Sierrita, Santa Rita, and Tortolita mountains, a broad pediment and *bajada* (alluvial fan slopes) extend outward in a relatively concentric pattern. The alluvium in some of the valleys (e.g., Santa Rosa Valley, Quijotoa Valley, Valley of the Ajo) is believed to be 800 to 2,000 feet deep (Richardson and Miller 1974). On the surface of these alluvial-filled valleys are large expanses of open ranch lands, as well as cultivated agricultural lands, as seen in the Altar, Avra, and Santa Cruz River valleys. Elsewhere on valley floors, the urban and suburban areas of Tucson, Marana, Sahuarita, Green Valley, Ajo, and other smaller communities predominate, taking advantage of the relatively level terrain and historical proximity to water.

3.1.2 Elevation and Drainage

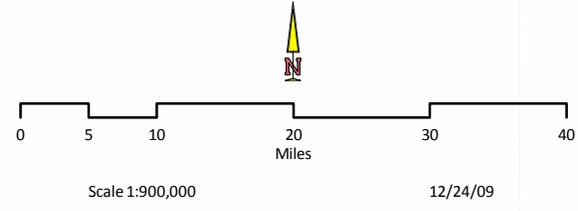
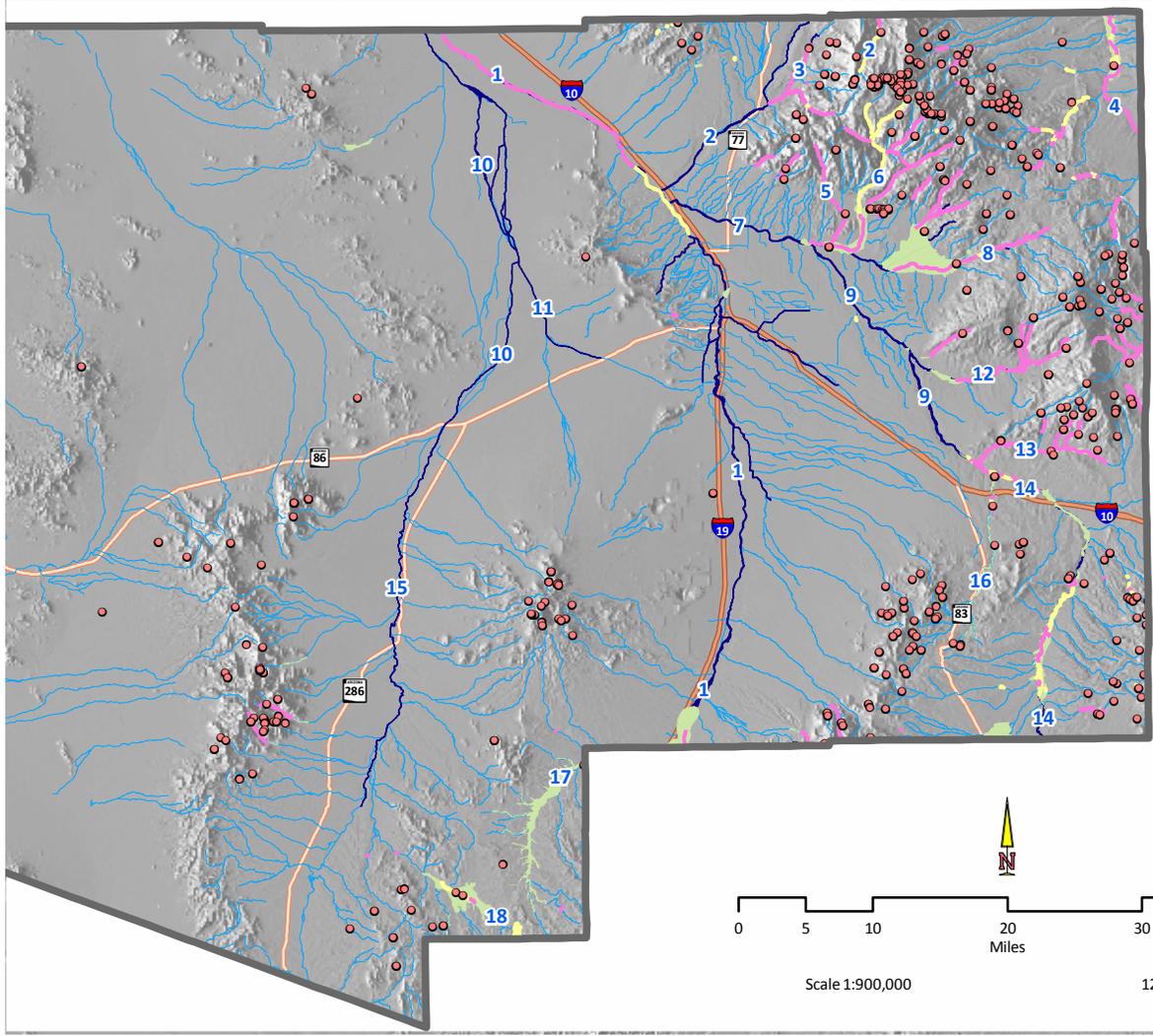
The extreme gradient of elevation in Pima County (from approximately 660 feet [200 meters] west of Ajo to a high point of 9,157 feet [2,791 meters] in the Santa Catalina Mountains north of Tucson) results in a diverse flora and fauna (McAuliffe 1999). The Santa Catalina, Santa Rita, Rincon, Baboquivari, and other mountains have served as refugia for species that may have otherwise disappeared during warm, interglacial periods that have occurred during the past 10,000 years. These and other mountain ranges are known collectively as “sky islands;” they support a unique flora and fauna. During glacial periods, and even historically, the floral and faunal constituents of the mountains and streams extended farther down into the valleys.

Most watercourses in Pima County drain to the north and northwest, eventually draining into the Gila, Salt, and Colorado rivers. Contrary to this pattern, the San Simon Wash in western Pima County drains south into Mexico. The headwaters of the Santa Cruz River also drain south into Mexico before returning on a northward course back into the United States and Pima County. Major watercourses in eastern Pima County are shown on Figure 3.3.

Most watercourses throughout Pima County are ephemeral, flowing only for short periods after seasonal rains. These watercourses are frequently delineated by mesquite, acacia, and other vegetation that occurs at higher densities and in larger sizes than in adjacent upland areas. Drainage patterns may be dendritic or distributary. Definite channels are at times lacking along some segments of ephemeral washes where storm water flows by spreading out over wide fluctuating floodplains (distributary flow). Watercourses with perennial and intermittent flows, and springs are less common. These isolated areas are punctuated by more dense stands of trees and shrubs, including remnant stands of historically present riparian gallery species of cottonwood, willow, sycamore, Arizona walnut, and Arizona ash.

Prior to the late 1800s, rivers such as the Santa Cruz meandered broadly within wide, vegetated floodplains. However, the trend beginning in the late 1800s and continuing into the 1900s, has been for river floods to erode and channels to widen, creating deeply incised channels also known as downcutting. Downcutting is thought to have resulted

- 1 - SANTA CRUZ RIVER
- 2 - CAÑADA DEL ORO WASH
- 3 - SUTHERLAND WASH
- 4 - SAN PEDRO RIVER
- 5 - VENTANA WASH
- 6 - SABINO CANYON
- 7 - RILLITO RIVER
- 8 - TANQUE VERDE WASH
- 9 - PANTANO WASH
- 10 - BRAWLEY WASH
- 11 - BLACK WASH
- 12 - RINCON CREEK
- 13 - AGUA VERDE CREEK
- 14 - CIENEGA CREEK
- 15 - ALTAR WASH
- 16 - DAVIDSON CANYON
- 17 - SOPORI WASH
- 18 - ARIVACA CREEK



- Spring
- Major Wash
- Shallow Groundwater
- Perennial Stream
- Other Wash
- Administrative Boundary
- Intermittent Stream

Figure 3.3
Major Watercourses in
Eastern Pima County

from a combination of indirect effects from such factors as overgrazing by cattle, drought, devegetation (e.g., woodcutting for building materials and fuel; clearing for cultivated fields), lowering of groundwater levels, and water diversions which resulted in the loss of vegetative cover and increased erosion (Cooke and Reeves 1976; Bahre 1991). Tucson originally grew from settlements along the Santa Cruz River, where water flowed year-round. Currently the Santa Cruz and other rivers flow only after heavy rains.

Within the urbanized areas of Tucson, Marana, and Green Valley, concrete and soil cement banks have been built to contain flood flows and reduce flood and erosion damage to adjacent developed areas.

3.1.3 Climate

At approximately 32 degrees north latitude, Pima County occurs within an arid and semi-arid zone that circles the globe (Figure 3.4). Precipitation tends to be sparse and infrequent along this global desert zone (Sellers et al. 1985; Merideth 2001; Sheppard et al. 2002; Lenart and Crawford 2007). Pima County's climate is dry, with relatively mild winters and extremely hot summers.

Average summer highs are in the upper 90 degrees Fahrenheit (° F) with peaks above 110° F. These high temperatures, along with low relative humidity, contribute to high water loss through evaporation and evapotranspiration.

Snow rarely falls below 3,000 feet elevation, and this, along with a warming climate, results in a latitudinal range shift of freeze-intolerant tropical plants and animals from Mexico. Southwestern Pima County is the warmest region of the County where nearly frost-free conditions permit the growth of tender plants, such as the organ pipe cactus which is found nowhere else in the United States. In eastern Pima County, the occurrence of hard freezes is an important influence on the vegetation composition of plant communities. Native plants and wildlife are uniquely adapted to the variations in temperature and rainfall.

Rainfall averages vary throughout the county from 3 to 15 inches a year, falling in two rainy seasons, winter and summer. There is an increasing gradient of rainfall from west to east in Pima County. The summer rainstorms (monsoons), influenced by tropical weather patterns from the gulfs of Mexico and California, are intense, brief, and localized. By contrast to the monsoon precipitation, winter precipitation is less intense, less localized, and less spatially variable, but is widely considered to be of higher ecological value than monsoon precipitation. The duration of the arid fore-summer is a key biological constraint for many species. The summer monsoon-type rains reduce water stress during the hottest portion of the growing season, which enables more diversity in the Sonoran Desert as compared to the Mohave Desert, which is dominated principally by winter rainfall.

Map Source: University of Arizona, College of Agriculture and Life Sciences, (http://cals.arizona.edu/AZWATER/publications/sustainability/report_html/full_img/ch1_05.gif) 2005

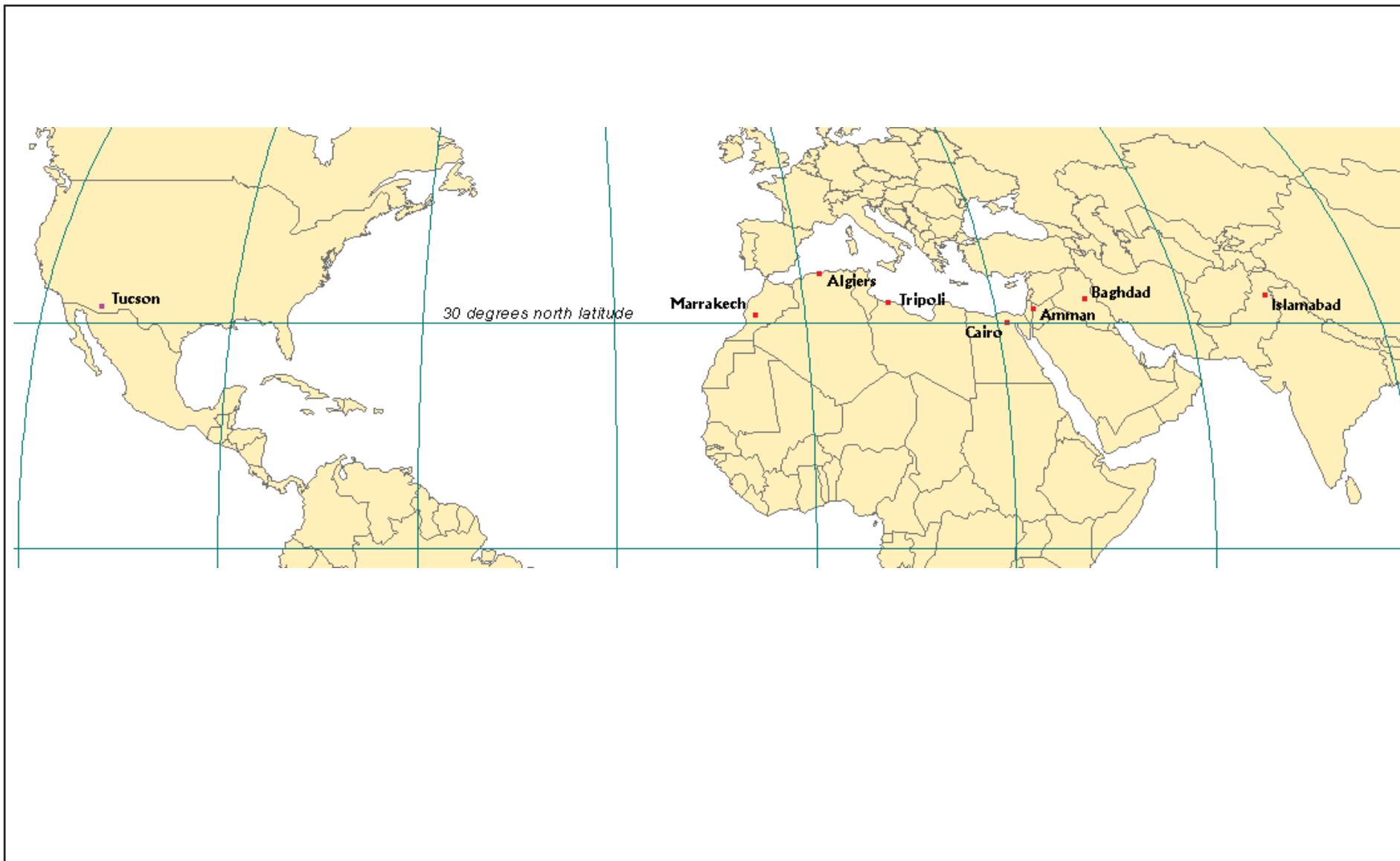


FIGURE 3.4
Pima County within Arid and Semi-Arid Zone that Circles the Globe

Pima County has been experiencing a prolonged drought since 1999. Most climate experts predict a future that includes a decrease in winter rains, an increase in year-round temperatures, and an expansion upslope of frost-free days (Weiss and Overpeck 2005; Seager et al. 2007). Responses to drought include extensive infrastructure and technology: groundwater pumping, large-scale inter-basin water transfers, exponential increases in energy use related to pumping and water transfers, and extensive landscape modifications (for example, removal of grass lawns and high water use landscapes). The amount of groundwater that has been withdrawn in recent years has far exceeded the amount replenished by rainfall and this situation is expected to be exacerbated by climate change (Carter et al. 2000). Global climatic patterns such as La Niña and El Niño affect Pima County's climate. La Niña results in drier winters and lower flows in rivers. El Niño, associated with warmer-than-usual eastern Pacific Ocean temperatures and changes in the jet stream, brings storms southward with resulting above-average precipitation in winter months, more floods, and more snow.

Climatic cycles directly and indirectly affect ecosystem function. Riparian and aquatic ecosystems are particularly sensitive to climatic variations such as timing and amount of precipitation, and temperature extremes. Climatic stresses, compounded by reduced surface flows and groundwater availability, have a direct effect on the life cycles of numerous species. Grasslands affected by drought can mean economic downturns for ranchers, long-term ecological damage, and increased fire potential. Higher elevation landscape "islands" support species' refugia that are typically isolated and vulnerable to climatic changes.

3.2 Water Resources

This section discusses water resources of Pima County and the major water issues related to the SDCP and the Pima County MSCP as follows: Limitations on Water Supply, Water Management, Water Law, and Water Quality.

3.2.1 Limitations on Water Supply

3.2.1.1 Water Supply for Humans

Pima County residents are almost entirely dependent on groundwater for all uses. This has led to a significant decline in the water table in much of eastern Pima County (e.g., Hill et al. 2001). Tucson-area residents currently get a large portion of their water supply from the Avra Valley.

Water from the Colorado River, via the Central Arizona Project (CAP), has recently begun to supplement groundwater for most water users in the County. This new source will help to prolong the supply of water for domestic use, agriculture, and industry; however, it will not prevent long-term depletion of groundwater resources under current population projections. Depending on the assumptions, the water demand for human

use will begin to exceed supplies at a population range of 1.2 to 1.38 million people unless additional water conservation, reallocations of water from agriculture or mining, or greater use of treated effluent can be achieved (Tellman 2001). Tucson Water, the largest municipal water provider with access to water supplies, estimates a need to find additional water supplies by 2025 (City of Tucson and Pima County 2009).

Projections of impacts of climate change are likely to shorten the estimates of the need to find additional water supplies by 2025 (Christensen et al. 2004). The drought of the early twenty-first century is an indication of the tenuousness of the surface water supply. While Tucson Water customers are shielded from many of the short-term impacts of drought by using a combination of groundwater and stored water from the Colorado River, many other water users do not have access to stored or alternative water supplies. Recharge of the Colorado River is dependent on annual renewal of supplies by precipitation within the multi-state Colorado River watershed, while groundwater is affected by reductions in natural recharge of aquifers.

Residents of Ajo and other areas of central and western Pima County are entirely dependent on a very limited supply of groundwater and very low annual precipitation. Residents of the Redington area in northeastern Pima County have both groundwater and a small amount of surface water in the San Pedro River and tributaries. The Ajo and Redington areas are not included in the Tucson Active Management Area (AMA) discussed below. Arivaca, on the other hand, is a relatively isolated basin within the AMA in southern Pima County, but hydrologically separate from the aquifers beneath the Tucson area. Replenishment in the Tucson metropolitan area would not benefit Arivaca where small increases in groundwater pumping could severely impact the Arivaca cienega, streams, and vegetation communities. Given the current state of water resources, it is clear that water supplies are a limiting factor for the continued growth of human populations.

Natural recharge in the Tucson AMA occurs from precipitation and runoff infiltration, mainly along mountain fronts and in stream/wash channels, as well as from direct underflow from joints and other openings in rocks. Snowmelt and mountain precipitation often infiltrate at the foot of mountain ranges, resulting in water recharge in the Tucson AMA of an average of 39,000 acre-feet annually. Stream and wash channel recharge in the Tucson area usually occurs as a result of infrequent, but occasionally large (such as during intense summer monsoon rains), stream flow events. A portion of the water that flows in streams and washes after heavy rains infiltrates the streambed to recharge the groundwater aquifer. Total stream channel recharge in the Tucson AMA averages about 38,000 acre-feet per year (Gelt et al. 1999).

Two techniques used for prolonging the supply are reuse and intentional recharge. Approximately 10 percent of the effluent produced in Pima County is directly reused, primarily for turf irrigation throughout the Tucson basin. The remainder is discharged into the Santa Cruz River where most of it eventually recharges the water table or is lost by

evaporation. Some of that recharge extends north into Pinal County. Existing projects to recharge CAP water and effluent occur in the Avra Valley, at Pima Mine Road, and along the Santa Cruz River, and act to save water for future needs.

3.2.1.2 Water for Riparian Use

In Pima County, water for human use has been a priority over providing adequate water for riparian and habitat needs. Pima County has mapped the distribution of natural sources of water for riparian use, including the shallow groundwater resources that sustain deciduous riparian forests along otherwise ephemeral streams.

Areas of shallow groundwater, as well as the perennial and intermittent streams and springs, have been identified for Pima County (Pima Association of Governments [PAG] 2000; Pima County 2000b). Priority shallow groundwater areas most in need of protection include: Arivaca Cienega/Creek, Tanque Verde Creek, Rincon Creek, Cienega Creek, Davidson Canyon, Middle San Pedro River, and Agua Verde Creek. There is potential for negative impacts to the streams and the resources they support from increased groundwater pumping in these areas (Pima County 2002a; PAG 2007a). Pima County has documented pumping and an increased number of wells placed in some shallow ground water areas (PAG 2007a). In the Tucson AMA, the Agua Caliente and Tanque Verde shallow ground water areas were associated with the largest amount of reported pumping (PAG 2007a). Water demand in Arizona through 2050 was modeled by Marshall et al. (2010), which indicated concerns for flows in the San Pedro, Cienega, and Arivaca areas.

Pima County has developed water policies to identify, avoid, and minimize impacts of groundwater development resulting from comprehensive plan amendments and rezonings on streams, springs, and shallow groundwater areas. Pima County has committed effluent of its own to several riparian projects, including the Kino Ecosystem Restoration Project and the Rillito River Ecosystem Restoration Project. Pima County's BOS has adopted a resolution that allocates County-owned water resources, including effluent and surface water rights, to the natural environment. Under an intergovernmental agreement between the City of Tucson and Pima County, up to 10,000 acre-feet of treated effluent per year may be set aside specifically to support riparian restoration projects, otherwise known as the Conservation Effluent Pool. Water can be delivered to sites via the reclaimed water system or left in the channel of the Santa Cruz River.

More than 130 water companies, irrigation districts, municipalities, and water cooperatives provide water in Pima County. More than 20,000 individuals and businesses have their own wells, as do many commercial users (most notably mining companies) and agricultural entities. Within the Tucson AMA, the Arizona Department of Water Resources (ADWR) sets rules under the Groundwater Management Act, but there is no central water management agency. ADWR has no authority under the state law to

manage groundwater and surface water conjunctively to protect riparian areas or recharge zones from surface hardening. ADWR and the many water providers in Pima County have some authority to regulate water use. Pima County has little authority to regulate water use even in the unincorporated areas.

Pima County does have the authority to implement land-use regulations and policies that promote water conservation, and has used land acquisition and floodplain regulation to protect aquifer recharge zones. Pima County processes most of the wastewater produced in the County, but because of an intergovernmental agreement with the City of Tucson, does not own most of the effluent or have the right to determine its use. CAP water in Pima County is primarily managed by the City of Tucson.

The Tohono O'odham Nation has control over a significant CAP allocation, which the Tribe uses in the San Xavier and the Shuk Toak districts. Most of the water is used for agriculture, but a portion in the San Xavier District is being used for aquifer recharge and riparian restoration projects. The Tribe also has rights to a portion of the treated wastewater from Pima County facilities under an agreement with the U.S. Department of the Interior.

3.2.2 Water Law: Groundwater vs. Surface Water

Arizona water law makes a clear distinction between groundwater and surface water. Surface water is legally considered a different entity from groundwater. Surface water is managed under the doctrine of prior appropriation, which requires people to apply for rights to use the water. People with seniority in terms of time of permit application have the right to use all of the water to which they are entitled, even if junior users do not get water ("first in time, first in right"). The only significant way a right can be lost is by failure to use the water beneficially over a period of time ("use it or lose it").

Within surface water law, there is a provision for granting instream flow permits, i.e., leaving water in the stream for the benefit of wildlife, riparian vegetation, or recreation. Within Pima County, a very small number of such permits have been granted; Pima County holds an in-stream flow certificate for Cienega Creek Natural Preserve. An instream flow permit does not guarantee a continued supply of water, since senior rights holders have priority over these later permits and because of the legal problems involved in protecting surface water rights from the effects of nearby groundwater pumping.

Groundwater is managed separately from surface water under the Groundwater Management Act, which has special provisions within AMAs. Most of Pima County east of the Tohono O'odham Nation, except for the San Pedro River watershed and a portion of the Cienega Creek watershed, is in the Tucson AMA. The Tucson AMA also includes the Arivaca groundwater system. The goal of the Tucson AMA is to attempt to reach safe yield, a balance between supply and demand, by year 2020. Large new wells may be drilled only if they meet certain conditions and the owner can demonstrate that a

legally defined 100-year supply exists. Small domestic wells are allowed with few or no restrictions. Within the AMA, there are rules requiring conservation measures for industry, agriculture, and water providers. Outside the AMA, there are very few legal restrictions on groundwater pumping.

Both inside and outside the AMA, groundwater and surface water rights are separate. People may pump water even if it affects streamflow and the senior rights of surface water users. Arizona Supreme Court decisions allow restrictions on pumping within the “subflow” area of a stream, but this remains to be fully defined. The separation of ground and surface water rights limits the ability of Pima County to protect streams in shallow groundwater areas in Pima County.

3.2.3 Water Quality

Under Federal Safe Drinking Water Act regulations, the EPA requires that all drinking water suppliers provide a water quality report that provides data to customers on an annual basis. As part of this reporting, water quality is continually monitored for public protection, health, and safety. In Pima County, water quality is tested and regulated by the Arizona Department of Environmental Quality (ADEQ) and the Pima County Department of Environmental Quality.

Having adequate water supplies depends not only on water quantity, but also on water quality adequate for the desired use, whether for humans or plants and wildlife. Although most of the groundwater in Pima County is of high quality for both purposes, there are a number of locations in the urban area where the groundwater has been contaminated to the point that ADEQ drinking water standards have been exceeded.

While the use of septic systems in Pima County can benefit water supply through direct recharge, it can negatively affect groundwater quality through recharge of inadequately treated water either because the area is not suitable for septic systems or because of poor maintenance. Most septic systems are located in suburban and ex-urban settings.

Under Arizona law, water quality standards apply to Pima County's surface water and are based on the designated use of the water body. There are seven uses ranging from domestic uses to agricultural irrigation or to aquatic and wildlife uses. Based on Arizona's Integrated 305(b) Assessment and 303(d) Listing Reports, surface water in Pima County generally meets standards for its designated uses (ADEQ 2009). A reach of Davidson Canyon recently received Outstanding Waters designation by ADEQ. This designation serves to protect water quality from being degraded by actions allowed under State-issued permits. Cienega Creek, which receives water from Davidson Canyon, is already considered an Outstanding Water of the State of Arizona. There are no designated waters that are not attaining water quality standards (Clean Water Act Section 303d impaired stream segments) designated in Pima County. Some Pima County streams that are important for wildlife are not monitored by the State water

quality agency, but most of these are within protected areas (PAG 2001a). Location of stream reaches does not necessarily preclude them from contamination from upstream, non-point source pollution, especially within watersheds implementing multiple-use policies. Along the largest stream, the Santa Cruz River effluent-dominated reach downstream of Tucson, too little oxygen and too much ammonia limit the diversity of aquatic macroinvertebrates (Walker et al. 2005).

The majority of perennial and intermittent surface water areas in Pima County are located within National Forest, National Park, or State Park boundaries where few sources of potential contamination (such as railroad tracks and interstates) occur. ADEQ is requiring Pima County to reduce the total nitrogen and ammonia discharged to the Santa Cruz River by January 2015.

The Cienega Creek Preserve is traversed by railroad tracks and Interstate 10, and spills from trains or vehicles along these active transportation corridors could contaminate water in the creek. In addition, surface-water contamination can be caused by improper range management, even on protected lands.

In Pima County, as elsewhere, water quality factors generally associated with the health of streams and rivers, as well as fish survival rates, include the chemical characteristics of pH, buffering capacity, dissolved oxygen, and nutrient levels. They also include physical characteristics such as stream width, temperature, substrate, water velocity, and volume. Riparian vegetation is another factor influencing water quality in Pima County. For example, at higher elevations, streamside trees provide shade that helps maintain cooler water temperatures, thereby increasing the stream's oxygen-carrying capacity. Plant roots help stabilize stream banks, reducing erosion, slowing runoff, and allowing sediments to settle.

3.3 Biological Resources

This section discusses the existing biological resources and the ecology of the area encompassed by the proposed Section 10(a)(1)(B) permit. Sensitive plant and wildlife resources known to occur, as well as those with the potential to occur, are addressed. This discussion is divided into six sub-sections: Regional Context; Special Plant Communities and Other Special Elements; Plant and Wildlife Species of Concern in Pima County; Federally Listed Threatened, Endangered, and Candidate Species; Invasive Species; and Pima County Regulatory Framework.

3.3.1 Regional Context

Pima County's plant and animal communities are constantly changing in response to climate and ongoing evolutionary processes and by the sequence of profound events: the end of the glacial period; the advent of people to North America; and the dramatic increases in human population, groundwater pumping, and land clearing during the last

century. Within the last 100 years most cienegas and riverine marshes have been eliminated, along with most perennial stream flows. Most of the aquatic and semi-aquatic areas have been lost or are imperiled, which has impacted many species of conservation concern in Pima County.

Pima County can be divided into two eco-regions (Marshall et al. 2006). The higher elevation eastern portion of Pima County has forests, woodlands, and grasslands of the Apache Highlands. The central and western portions of Pima County are much lower in elevation and characterized by Sonoran Desert vegetation. The biological diversity of the region can be attributed to these elevational differences and because of the County's location between the subtropics of Central America and the temperate climatic zones of North America. One aspect of the biodiversity is the level of endemism of plants, small mammals, fish, reptiles, and insects that occurs in Pima County (Fonseca et al. 1999). Many species are at the northern limits of their range, because Pima County is positioned at the edge of the tropics. The sky islands that occur in the mountains in Pima County are considered to be the northern extent of the mountain range of Sierra Madre Occidental of Mexico. By contrast, few species are at the southern limit of their range because of higher elevations to the south in Mexico.

Important and rare natural resources in Pima County include the remaining aquatic and riparian communities. They are rich in biodiversity and critical for many species, especially birds, fish, amphibians; and aquatic reptiles, invertebrates, and plants. Rivers serve as primary migration corridors for dispersing and colonizing species. For example, important north-south corridors, such as the Santa Cruz, San Pedro, and Colorado rivers are critical to birds that migrate between the United States and Mexico (Skagen et al. 1998). These corridors and the remaining riparian and aquatic communities that exist along them are used by approximately 75 percent of all the bird species that migrate between the United States and Mexico (Finch 1991; Hardy et al. 2004). Native fish, frogs, snakes, and other aquatic species have become increasingly imperiled as the amount and distribution of riparian and wetland ecosystems of Pima County have diminished (Scalero et al. 2000; Rosen and Mauz 2001).

3.3.2 Special Plant Communities and Other Special Elements

Pima County identified a host of Special Plant Communities and other Special Elements that contribute to the protection of native species under the MSCP. Special Plant Communities and other Special Elements are landscape features that have been used in the Pima County MSCP reserve design (Fonseca and Connolly 2002), and were considered and used to constrain or influence the extent and boundaries of the CLS:

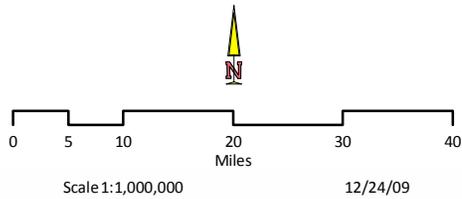
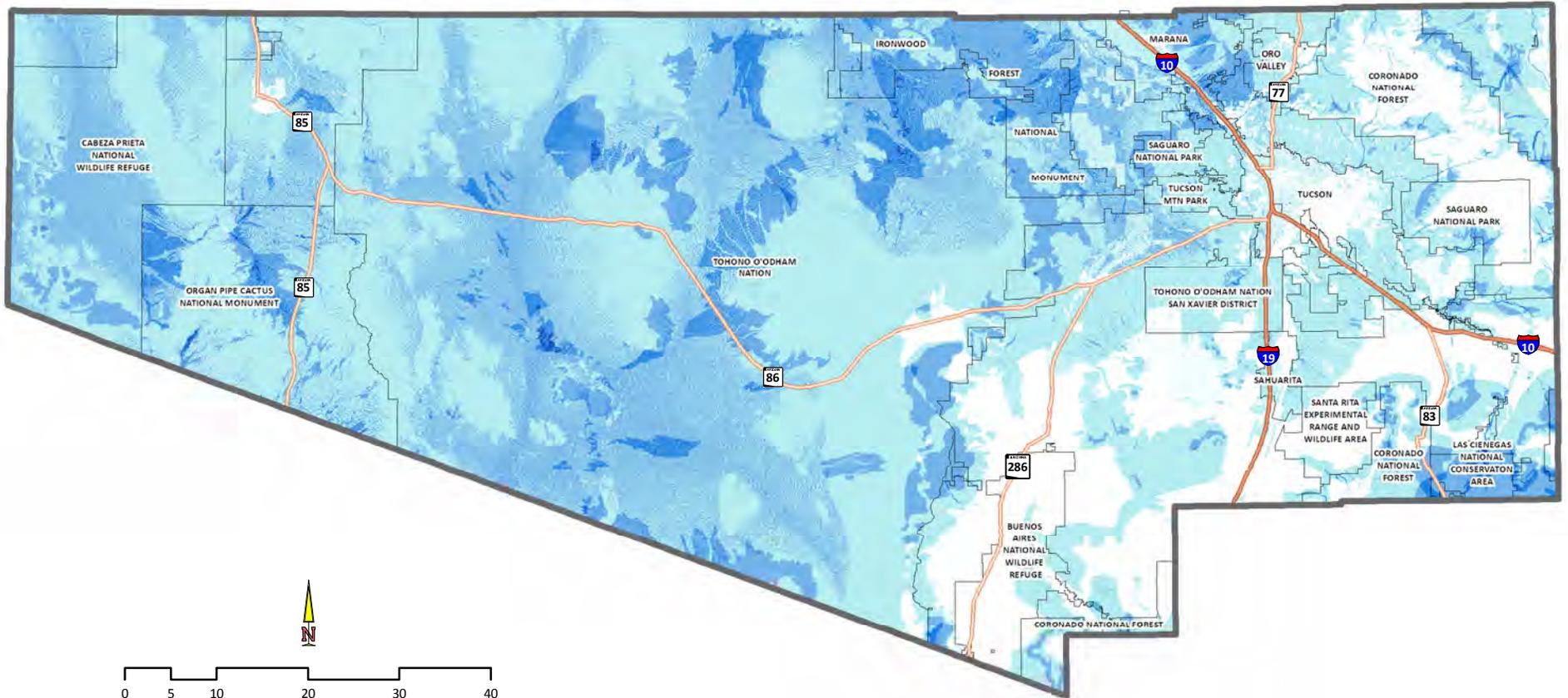
- Cattail
- Cottonwood–Willow

- Creosote–Bursage
- Douglas Fir–Mixed Conifer
- Un-incised Floodplain
- Interior Southwest Riparian Deciduous Forest
- Intermittent Streams with 300-foot Buffer
- Ironwood
- Limestone Outcrop
- Mesquite Bosque
- Native Upland Grassland
- Oak Scrub Grassland Ecotone
- Perennial Streams with 300-foot Buffer
- Palo Verde–Mixed Cactus
- Sacaton Grasslands
- Saltbush
- Springs with 300-foot Buffer
- Sonoran Riparian Scrub
- Talus Slopes
- Low Elevation Valley Floors (<2,500 feet)

Most of the Special Plant Communities and other Special Elements are vegetation community types, while others represent specific resources that are important for individual species, such as talus slopes for talussnails. Figure 3.5 shows richness of Special Plant Communities and other Special Elements, with areas of higher richness indicated by darker shades.

3.3.3 Plant and Wildlife Species of Concern in Pima County

As part of the MSCP planning effort, Pima County originally identified 55 species for possible inclusion under a Section 10(a)(1)(B) permit because of known or potential threats to their populations and/or because populations were small or spatially restricted. The list includes federally listed species and State-listed species of special concern. These species, once known as PVS (Pima County 2001d), were used in a variety of planning efforts, including the creation of the CLS (Pima County 2001e). The original list of PVS has since been reduced to 44 species that were determined to warrant inclusion into the County's Section 10(a)(1)(B) permit (Table 3.1). These are now known as the Covered Species in the MSCP, because they are proposed for coverage under the permit.



Special Element "Richness"

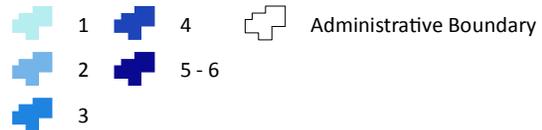


Figure 3.5
Special Elements "Richness"

**TABLE 3.1
MSCP COVERED SPECIES FOR PIMA COUNTY'S SECTION 10(A)(1)(B) INCIDENTAL TAKE PERMIT**

Common Name	Scientific Name	Federal Listing Status
Plants (4 species)		
Pima pineapple cactus	<i>Coryphantha scheeri</i> var. <i>robustispina</i>	Endangered
Needle-spined pineapple cactus	<i>Echinomastus erectocentrus</i> var. <i>erectocentrus</i>	Not listed
Huachuca water umbel	<i>Lilaeopsis schaffneriana</i> ssp. <i>recurva</i>	Endangered
Tumamoc globeberry	<i>Tumamoca macedougalii</i>	Not listed
Mammals (7 species)		
Mexican long-tongued bat	<i>Choeronycteris mexicana</i>	Not listed
Western red bat	<i>Lasiurus blossevillii</i>	Not listed
Western yellow bat	<i>Lasiurus xanthinus</i>	Not listed
Lesser long-nosed bat	<i>Leptonycteris curasoae yerbabuena</i>	Endangered
California leaf-nosed bat	<i>Macrotus californicus</i>	Not listed
Pale Townsend's big-eared bat	<i>Corynorhinus townsendii pallescens</i>	Not listed
Merriam's mouse	<i>Peromyscus merriami</i>	Not listed
Birds (8 species)		
Western burrowing owl	<i>Athene cunicularia hypugaea</i>	Not listed
Cactus ferruginous pygmy-owl	<i>Glaucidium brasilianum cactorum</i>	Petitioned
Rufous-winged sparrow	<i>Aimophila carpalis</i>	Not listed
Swainson's hawk	<i>Buteo swainsoni</i>	Not listed
Yellow-billed cuckoo (western distinct population segment)	<i>Coccyzus americanus</i>	Threatened
Southwestern willow flycatcher	<i>Empidonax traillii extimus</i>	Endangered
Abert's towhee	<i>Melospiza aberti</i>	Not listed
Arizona Bell's vireo	<i>Vireo bellii arizonae</i>	Not listed
Reptiles (6 species)		
Desert box turtle	<i>Terrapene ornata luteola</i>	Not listed
Tucson shovel-nosed snake	<i>Chionactis occipitalis klauberi</i>	Not listed
Sonoran desert tortoise	<i>Gopherus morafkai</i>	Not listed
Groundsnake (valley form)	<i>Sonora semiannulata</i>	Not listed
Northern Mexican gartersnake	<i>Thamnophis eques megalops</i>	Threatened
Giant spotted whiptail	<i>Aspidoscelis stictogramma</i>	Not listed
Amphibians (2 species)		
Chiricahua leopard frog	<i>Lithobates chiricahuensis</i>	Threatened
Lowland leopard frog	<i>Lithobates yavapaiensis</i>	Not listed
Fish (5 species)		
Longfin dace	<i>Agosia chrysogaster</i>	Not listed
Desert sucker	<i>Catostomus clarki</i>	Not listed
Sonora sucker	<i>Catostomus insignis</i>	Not listed
Gila chub	<i>Gila intermedia</i>	Endangered
Gila topminnow	<i>Poeciliopsis occidentalis occidentalis</i>	Endangered
Invertebrates (12 species)		
Papago talussnail	<i>Sonorella ambigua</i>	Not listed
San Xavier talussnail	<i>Sonorella eremita</i>	Conservation Agreement
Total Wreck talussnail	<i>Sonorella imperatrix</i>	Not listed
Empire Mountain talussnail	<i>Sonorella imperialis</i>	Not listed
Sonoran talussnail	<i>Sonorella magdalenensis</i> syn. <i>tumamocensis</i>	Not listed
Pungent talussnail	<i>Sonorella odorata</i>	Not listed
Posta Quemada talussnail	<i>Sonorella rinconensis</i>	Not listed
Santa Catalina talussnail subspecies	<i>Sonorella sabinoensis buehmanensis</i>	Not listed
Santa Catalina talussnail subspecies	<i>Sonorella sabinoensis tucsonica</i>	Not listed
Las Guijas talussnail	<i>Sonorella sitiens</i>	Not listed
Tortolita talussnail	<i>Sonorella tortillita</i>	Not listed
Santa Rita talussnail	<i>Sonorella walkeri</i>	Not listed

Detailed information and mapped potential distribution of these species and their habitats in Pima County is presented in various SDCP reports (Fonseca et al. 1999; RECON 2000a, 2000c; Pima County 2001d). Information about the current distribution of Covered Species can be found in Appendix A of the Pima County MSCP.

3.3.4 Federally Listed Threatened, Endangered, and Candidate Species

Of the MSCP proposed Covered Species, the USFWS currently lists the following as endangered, threatened, or candidate species:

Listed endangered:

- southwestern willow flycatcher with critical habitat
- lesser long-nosed bat
- Gila topminnow
- Gila chub with critical habitat
- Huachuca water umbel with critical habitat
- Pima pineapple cactus

Listed threatened:

- Chiricahua leopard frog (*Rana chiricahuensis*)
- northern Mexican gartersnake (*Thamnophis eques megalops*)
- western yellow-billed cuckoo (*Coccyzus americanus*)

Brief descriptions of federally listed endangered, threatened, and candidate species are given below, including information on critical habitat. More detailed natural history information is synthesized in the Pima County Priority Vulnerable Species analysis and review (2001d), and the most up-to-date distribution information can be found in Appendix A of the Pima County MSCP. Note that the cactus ferruginous pygmy-owl is currently not listed by USFWS as endangered, threatened, or as a candidate species. It was previously listed in the Arizona portion of its range as an endangered species in 1997. USFWS removed the pygmy-owl from the endangered species list in 2006. In 2007, the USFWS was petitioned to list the species again based on additional genetic, taxonomic, and threats information. On October 5, 2011, the USFWS determined that the pygmy-owl did not warrant endangered species protection. A lawsuit was filed on August 20, 2012 challenging the USFWS's finding, but was later dropped.

Southwestern willow flycatcher: Listed as endangered under the ESA with designated critical habitat in northeastern Pima County along the San Pedro River (USFWS 2011). The recovery plan for this species was approved in August 2002. Recovery actions in Pima County include population and habitat protection and improvements along Cienega Creek from Empire Ranch to Pantano Road, and along the San Pedro River. This

species is known from riparian tree and shrub communities, including dense stands of tamarisk. This species has been documented to breed at Bingham Cienega and at Cienega Creek, where critical habitat was designated on the Las Cienegas National Conservation Area.

Lesser long-nosed bat: Listed as an endangered species under the ESA. The 1994 recovery plan envisions protection of roosts and foraging habitat. This migratory bat species overwinters in Mexico and arrives in the United States in April and stays through October. It is dependent on mines and caves for roosting and on organ pipe cacti (*Stenocereus thurberi*), agaves, and saguaros (*Carnegiea gigantea*) for feeding. In addition to feeding on flower nectar, lesser long-nosed bats also use hummingbird feeders in suburban areas.

Gila topminnow: Listed as an endangered species under the ESA. A recovery plan was approved in 1984, and an update by the USFWS is planned. Goals for recovery of the species include the protection of sites currently occupied by natural populations and maintenance of refugia stocks of each natural population. Recovery efforts implemented by the Arizona Game and Fish Department (AZGFD) have resulted in species persistence, but survival rates remain low. The basic habitat requirement for Gila topminnow is permanent water that is free of non-native predators. While this species can tolerate a wide range of water temperature and quality, its preferred habitat contains dense mats of algae and debris with sandy substrates. Typical aquatic habitat, where Gila topminnow may occur, includes rivers, streams, cienegas, or ponds.

Gila chub: Listed as an endangered species under the ESA. A recovery plan has not been completed for this species to date. This native fish is typically found in small headwater streams, cienegas, and marshes; however, it uses diverse habitat types based on the season and age of the fish. Adults prefer deep pools with heavily vegetated margins and undercut banks, while juveniles use small riffles, pools, and undercut banks of runs. This omnivorous fish feeds on insects and relies on beds of submerged aquatic vegetation for spawning. Critical habitat in Pima County for the Gila chub is found in Sabino Canyon and two locations along Cienega Creek, including in the County's Cienega Creek Natural Preserve (USFWS 2005).

Huachuca water umbel: Listed as an endangered species under the ESA with a recovery plan in development. The habitat requirements for this semi-aquatic plant include perennial water, gentle stream gradients, and permanently wet substrate such as sand, mud, or silt for underground rhizomes. Population size of Huachuca water umbel plants fluctuates in response to both flood cycles and changing site characteristics. This species occurs in slow-moving water, such as ponds and cienegas, within Sonoran desertscrub, grasslands, oak woodlands, and conifer forests. Critical habitat for the species occurs in Santa Cruz and Cochise counties, Arizona (USFWS 1999).

Pima pineapple cactus: Listed as an endangered species under the ESA. Recovery goals and a recovery plan have not been completed for this species to date. This cactus is found mostly in semidesert grassland and on alluvial fans of Sonoran desertscrub. This species usually occurs on flat ridge tops with little slope, in soils that are mostly rocky loams, and in open areas lacking dense grass cover. The requirements for this species are not well understood, but it appears to prefer well-drained soil. This species' limited range and sparsely distributed populations suggest specialized needs that require further research.

Chiricahua leopard frog: Listed as threatened under the ESA. A recovery plan was completed in 2007. This frog is an aquatic and riparian species that uses a variety of water sources including rocky streams with deep, rocky pools, overflow pools and oxbows of rivers, permanent springs, ponds, and wetlands. It may also occur in thermal springs and seeps, stock tanks, wells, and mainstream river reaches. This species forages for arachnids, crustaceans, and insects, often in adjacent upland habitats including oak and pine-oak woodlands, chaparral, grassland, and desert. An ideal habitat for this frog would include permanent water for breeding; suitable amounts of terrestrial and aquatic vegetation; and the absence of non-native crayfish (*Orconectes virilis*), bullfrogs (*Lithobates catesbeiana*), and predatory fish species. Critical habitat has been designated in a number of sites in Pima County, including in the Altar Valley (primarily on the Buenos Aires National Wildlife Refuge), Florida Canyon (Santa Rita Mountains), and on the east side of the Santa Rita Mountains (USFWS 2012a).

Northern Mexican gartersnake: A threatened species under the ESA (August 7, 2014; 79 FR 38677). Habitat is along permanent water courses from 3,000 to 6,000 feet elevation. Riparian and aquatic features that provide habitat for this species include slow-moving water or still water. Surveys for this species in Mexico suggest that in the absence of non-native species, vegetation is much less correlated with occupied habitat (and the inverse seems to also be true). This species is currently restricted to just a few locations in Pima County. The northern Mexican gartersnake is particularly dependent on a native prey base and is highly vulnerable to the adverse effects of predation and competition posed by non-native species such as crayfish, bullfrogs, and predatory fishes. Approximately 421,000 acres of critical habitat for the northern Mexican gartersnake was proposed on July 10, 2013, of which approximately 157,000 acres occurs in Pima County. In the proposed critical habitat, three areas of Pima County were included: (1) Buenos Aires National Wildlife Refuge in the Altar Valley, (2) Cienega Creek, and (3) the San Pedro River. The area of the Cienega Creek Natural Preserve is being proposed for exclusion from the critical habitat designation.

Western yellow-billed cuckoo: A threatened species under the ESA (October 3, 2014; 79 FR 59992). This migratory species nests in cottonwood–willow riparian areas and in well-developed mesquite bosques. While dense riparian habitats provide more suitable habitat for migrating and nesting, individuals have also been recorded in pecan groves

along the Santa Cruz River in the Green Valley area. The primary threat to these rare birds is the continued loss, degradation, and fragmentation of mature cottonwood-willow riparian habitat. Critical habitat for this species has been proposed (November 12, 2014; 79 FR 67154).

Mexican spotted owl: A threatened species under the ESA. Critical habitat for the Mexican spotted owl (*Strix occidentalis lucida*) in Pima County is primarily within the Coronado National Forest and Saguaro National Park (USFWS 2004). The critical habitat designation covers a small portion of private lands in Pima County, including Summerhaven and a portion of the Tanque Verde Valley. The Mexican spotted owl occurs in Pima County, but it is not proposed as a Covered Species under the Pima County MSCP because of the low probability that Covered Activities would result in take. In addition, a Federal nexus exists for Pima County's maintenance of the Mount Lemmon Highway and wastewater disposal activities near Summerhaven, which requires Section 7 consultation. However, the avoidance, minimization, and mitigation measures to be applied through the County's Section 10 permit would contribute to conservation of the Mexican spotted owl.

Jaguar: An endangered species under the ESA. The jaguar (*Panthera onca*) occurs in Pima County, and critical habitat was proposed by the USFWS on August 17, 2012 for portions of southeastern Arizona and southwestern New Mexico (USFWS 2012b). Final designation of critical habitat for the jaguar occurred on March 5, 2014 (79 FR 12571). This species is not proposed as a Covered Species under the Pima County MSCP because of the low probability that Covered Activities would result in take. Pima County has no significant ongoing or planned activities within jaguar critical habitat that would require Federal authorizations, funding, or permits. The principal activities within jaguar critical habitat consist of ranching and recreational activities that are unlikely to sever the connection of jaguar habitat in southern Arizona to habitat in Mexico. Pima County owns and manages ranch land within jaguar critical habitat, primarily the Sands and Clyne ranches, which are deeded lands, and the Haybrook Ranch, which includes grazing permit on Federal lands in the Baboquivaris. Mitigation commitments in the MSCP include permanent protection of deeded ranch lands through conservation easements that would prevent future development from occurring whether the lands are inside or outside jaguar critical habitat. In addition, avoidance, minimization, and mitigation measures to be applied through the County's Section 10 permit would contribute to conservation of the jaguar, primarily through legal protection and management of mitigation lands in proposed critical habitat.

Acuña cactus: An endangered species (October 1, 2013) under the ESA. The acuña cactus (*Echinomastus erectocentrus* var. *acunensis*) occurs in Pima County, and critical habitat was proposed by the USFWS on July 8, 2013 in Maricopa, western Pima, and Pinal counties (USFWS 2013). This species is not proposed as a Covered Species under the Pima County MSCP, because minimal, if any, overlap occurs between

proposed critical habitat and proposed Covered Activities. This species occurs in valleys and on small knolls and gravel ridges of up to 30 percent slope in the paloverde–saguaro association of the Arizona Upland subdivision of the Sonoran Desert scrub at 1,198 to 3,773 feet in elevation.

3.3.5 Invasive Species

Invasions by non-native species cause serious problems in many parts of Pima County, as they do throughout the world (D'Antonio and Vitousek 1992; Richardson et al. 2000). Invasive plants can crowd out native species (Morales–Romero and Molina–Freyer 2007), may alter natural fire regimes, and sometimes render areas inhospitable to native fauna. Virtually all Arizona native fish species have either suffered extirpations or are listed as threatened, endangered, or candidate species, largely due to competition with and predation from invasive non-native fish, crayfish, and bullfrogs (Minckley and Deacon 1991). Only a few watercourses in Pima County have thriving native fish populations that are free from invasive species. In 1999, President Clinton issued an Executive Order that directed Federal agencies to consider the impacts of invasive species when taking a variety of actions. One result of this order was the establishment of the Federal Interagency Committee on the Management of Noxious and Exotic Weeds. The committee comprises all Federal agencies involved in activities with potential invasive species impacts, and some non-governmental groups working on invasive issues. Most of these government agencies have developed plans for invasive species prevention and control. Keeping designated noxious weeds and insect pests out of the United States is a major effort of the U.S. Department of Agriculture's Animal and Plant Inspection Service. Control and prevention of invasive species are major concerns for the USFWS, the BLM, and other agencies.

Invasive plant and animal species control has emerged as a significant concern in Pima County and elsewhere in Arizona, especially in the past few years. The Arizona Department of Agriculture has an Insect Pest Control Program and a Noxious Weed Control Program. The AZGFD is working to control and prevent problems caused by invasive fauna, especially in riparian areas and wetlands.

Many of the goals of the SDCP depend upon control or eradication of invasive species, with a particular focus on buffelgrass (*Pennisetum ciliare*). Some problematic invasive species, such as Lehmann lovegrass, are currently well established in Pima County. Table 3.2 below describes select invasive species with documented or suspected impacts within Pima County. Some species are problems in some parts of the County, but not in other parts, underscoring the importance of preventing introduction and spread into new areas and managing areas already invaded. Finally, there are some species that are not yet problems in Pima County, but are likely to become problems unless preventive measures are taken. In all cases, it is clear that cooperative efforts are needed if real prevention and control are to be effective. This is also necessary in most

cases where successful reintroduction of native species, such as leopard frogs and fish, depends on the control of invasive aquatic species such as bullfrogs, crayfish, and non-native fish.

**TABLE 3.2
SELECT PROBLEMATIC EXOTIC/INVASIVE SPECIES WITHIN PIMA COUNTY**

Species	Documented or Suspected Impacts in Pima County
Bullfrog (<i>Rana catesbeiana</i>)	Preys on many native wildlife species, including northern Mexican gartersnakes, Chiricahua leopard frogs, and lowland leopard frogs. Implicated as a significant factor in their regional decline. This species is highly effective at colonizing suitable habitat (permanently ponded water and other wetlands).
Green sunfish (<i>Lepomis cyanellus</i>) and other non-native Cichlids	Predation by green sunfish and other non-native fish is also a contributor to the regional decline of amphibians. Introduced as a sport fish, it is a significant predator on the Gila chub in Sabino Creek (Tucson area) and may be responsible in large part for the loss of that and other native fish species from much of their former range. The AZGFD and the U.S. Forest Service have accomplished a successful eradication program in Sabino Canyon and other locations.
Western mosquitofish (<i>Gambusia affinis</i>)	The Western mosquitofish has been intentionally distributed for mosquito control and has negatively impacted populations of leopard frog, other frogs, and most native fishes.
Red shiner fish (<i>Cyprinella lutrensis</i>)	Red shiners are omnivorous and known to consume and compete with other aquatic species.
Northern crayfish (<i>Orconectes virilis</i>) and Red swamp crayfish (<i>Procambarus clarkia</i>)	Crayfish are known to alter and deplete aquatic vegetation, which could include Huachuca water umbel, and are predators on native invertebrate and vertebrate species. They have been documented preying upon hatchling mud turtles and are associated with the decline of native frogs and gartersnakes. Originally introduced for aquatic weed control and forage for sport fish, and often released as live bait, crayfish are now widespread in rivers, streams and lake margins.
House sparrow (<i>Passer domesticus</i>), European starling (<i>Sturnus vulgaris</i>), Rock dove (<i>Columba livia</i>), and Eurasian collared dove (<i>Streptopelia decaocto</i>)	Cavity-nesting house sparrows and European starlings compete with native birds for nest cavities, which can be scarce and limit reproductive output in some areas. Large populations of starlings in agricultural areas can cause significant economic losses due to consumption and contamination of livestock feed and stored grain, and damage to crops. Rock doves and Eurasian collared doves compete with native birds for food, water, and safe roost locations.
Tamarisk/Salt cedar (<i>Tamarix</i> spp.)	Abundant in most watersheds of the arid Southwest and rapidly overcomes riparian areas and spring ecosystems, especially those with altered hydrological regimes. It can dry up water sources and thereby eliminate wetland habitat for amphibians. (Some landscapes are so altered that native plant species can no longer survive due to increased soil salinity, and the tamarisk thickets provide the only available cover for lizards and other species. Southwestern willow flycatchers are known to use tamarisk for nesting where appropriate native riparian plant communities are no longer present.)

TABLE 3.2
SELECT PROBLEMATIC EXOTIC/INVASIVE SPECIES WITHIN PIMA COUNTY

Species	Documented or Suspected Impacts in Pima County
Buffelgrass (<i>Pennisetum ciliare</i>), Fountain grass (<i>P. setaceum</i>), Lehmann lovegrass (<i>Eragrostis lehmanniana</i>), Red brome (<i>Bromus rubens</i>), Mediterranean grass (<i>Schismus</i> spp.), and Bermuda grass (<i>Cynodon dactylon</i>)	These non-native grasses crowd out native grasses and compete for scarce water. Increased frequency and intensity of fires has occurred where they dominate, and this can result in loss of many native plant species, with a cascade effect on animal species. Their high seed production, fire tolerance, and resiliency enable their expansion. Burning often encourages proliferation. A combination of manual removal, herbicide application, and seeding with native species is often the most effective approach to combating invasive grasses.
Other	Other species of concern include free-roaming domestic dogs, cats, and other pets; African daisy (<i>Dimorphotheca sinuata</i>); African sumac (<i>Rhus lancea</i>); giant reed (<i>Arundo donax</i>); Sahara mustard (<i>Brassica tournefortii</i>); Malta starthistle (<i>Centaurea melitensis</i>); feral pigs; cowbirds; fire ants (if introduced); and many others.

Note: Additional information on many of these species can be found in Pima County 2000c.

3.3.5.1 Invasive Plants

3.3.5.1.1 Invasive Grasses

Non-native grasses present some of the most challenging problems in Pima County, because of their aggressive nature and the fire hazard they present to Sonoran Desert ecosystems. Sonoran Desert plant communities evolved with only rare, low-intensity, and small-scale fires due to the naturally sparse groundcover. Plants such as saguaro and barrel cacti are not adapted to burning. With the introduction of non-native grasses, especially buffelgrass, the likelihood of hotter, more frequent and larger-scale fires increases the risk of the death of saguaros, barrel cacti, and other native plants that burn or subsequently die due to extensive damage. It takes many years for cacti to recolonize these areas and it is likely that non-native grasses will instead predominate in the long term. Wildfires fueled by non-native grasses can also impact native aquatic species when sediments and ash from newly burned land flows into streams and pools, filling them and eliminating habitat for native fish and frogs.

The U.S. Soil Conservation Service (now the Natural Resources Conservation Service) introduced buffelgrass for cattle forage in the 1950s in Arizona and in Sonora, Mexico. It was not recognized as a serious problem until the late 1980s and was added in early 2005 to the Arizona Department of Agriculture Noxious Weed List. Travel corridors across the international border are a major source of dispersal. Buffelgrass is taken very seriously by land managers because it threatens most populations of iconic Sonoran

Desert plants such as the saguaro and the organ pipe cactus with wildfire and competition for resources. The Southern Arizona Buffelgrass Coordination Center was recently created for controlling buffelgrass (Rogstad 2008).

Another problematic non-native grass in Pima County is Lehmann lovegrass (*Eragrostis lehmanniana*). Although this species occurs in historical grasslands, which are fire-adapted communities, its prevalence reduces biodiversity. Lehmann lovegrass forms a vast and nearly monotypic plant community in many areas of southern Arizona, such as the Santa Rita Experimental Range (Mau-Crimmins et al. 2006). While a range of native species persists here (including the endangered Pima pineapple cactus, which is not fire-adapted), population levels are much lower than those that inhabit native grassland areas.

Other problematic plants include several species of mustard, including Sahara mustard (*Brassica tournefortii*) and Malta starthistle (*Centaurea melitensis*). These plants can rapidly take over large regions, often starting along roadsides and other disturbed areas. They may also create fire hazards when the dried plants remain on site.

3.3.5.1.2 Invasive Ornamental Plants

Some invasive species entered the Sonoran Desert region as ornamental landscape plants. Many of the same characteristics of xeriscape plants from other parts of the world that make them water-efficient landscape choices also allow them to establish successfully in unintended areas, particularly along roadsides or washes.

Fountain grass (*Pennisetum setaceum*), is an example of a popular landscape plant whose invasive properties were not recognized when it was first introduced. This large bunchgrass, which is related to buffelgrass, crowds out native species and presents a serious fire hazard. The ADWR has eliminated all but an infertile variety from the approved Low-Water Plant List for the Tucson AMA. Fountain grass has already become common along roadsides and in many washes that connect the urban area to natural areas within Pima County. Pampas grass (*Cortaderia selloana*) has caused similar problems in California and has naturalized in some areas of Pima County.

Invasive landscape trees and shrubs include African sumac (*Rhus lancea*), tamarisk (also known as saltcedar [*Tamarix chinensis* and *T. ramosissima*]), and tree-of-heaven (*Ailanthus altissima*). Tamarisks are fire-adapted species and have long tap roots that allow them to intercept deep water tables and interfere with natural aquatic systems. Tamarisk degrades native wildlife habitat by outcompeting and replacing native plant species and provide fewer resources for most wildlife species. Tamarisk also affects vegetation communities by increasing soil salinity through shedding salt-laden leaves, monopolizing limited sources of moisture, and increasing the frequency, intensity, and effects of fires and floods (Shafroth et al. 2005). Although both species provide some

shelter, the foliage and flowers of tamarisk provide little food value for native wildlife species that depend on nutrient-rich native plant resources.

African sumac is commonly seen in Tucson foothill washes, where in some places it is becoming the dominant tree, replacing the native plants. This tree is highly aggressive and birds spread seeds over long distances. It produces thousands of seeds annually, and also spreads by root suckers; is very difficult to eradicate once established. The ADWR has recently eliminated this species from the approved Low-Water Plant List for the Tucson AMA.

Tree-of-heaven was a popular landscape plant from the 1930s to the 1960s and can still be found in yards throughout urban areas. It has become a problem species along streams such as Sonoita Creek. In Pima County, it has escaped into xeroriparian washes, but is not yet a threat in areas such as Cienega Creek. This species is a prolific seed producer that grows quickly and often forms an impenetrable thicket. Tree-of-heaven also produces toxins that prevent the establishment of other plant species and has aggressive root systems that can damage sewers and foundations.

3.3.5.2 Invasive Animal Species

The AZGFD introduced non-native fish, bullfrogs, and crayfish for sport purposes starting in the early 1900s. The major avenues of spread of non-native aquatic species are by humans who dump unwanted aquatic fish and snails into ponds (e.g., at Agua Caliente Park), move individuals from one location to another in bait buckets or fishing equipment, and/or who host species such as bullfrogs in their backyard ponds from which the frogs may escape and disperse to other aquatic locations. Bullfrogs and crayfish are also very adept at natural dispersal over significant distances from occupied sites via perennial streams, intermittent streams, or over land.

It was not until the 1980s that scientists determined that bullfrogs and crayfish contributed to the loss of native fish, frogs, and snakes (Hayes and Jennings 1986). Researchers determined that bullfrogs were also eating a wide range of species such as bats and birds. University of Arizona scientists, including Drs. Cecil Schwalbe and Phil Rosen, developed programs to eliminate bullfrogs, with extensive programs in Pima County at Buenos Aires National Wildlife Refuge, and more recently in the Cienega Creek watershed. They determined that efforts to reestablish native species were not likely to be successful unless invasive aquatic species were effectively eliminated or severely limited, especially along streams and in ponds where the natural flow processes were degraded or destroyed (Schwalbe and Rosen 1988).

The USFWS has expressed concerns about the potential for water transported by the CAP to unintentionally spread non-native fish, snails, and other aquatic species to watercourses near its path. For this reason, the USFWS is concerned about the use of untreated CAP water for proposed riparian restoration projects, such as the Paseo de

las Iglesias, Tres Rios del Norte, and the Rio Nuevo projects along the Santa Cruz River. In Aravaipa Canyon, for example, the USFWS, in conjunction with the U.S. Bureau of Reclamation and the Nature Conservancy, built fish barriers in an attempt to prevent non-native fish from migrating upstream to areas that support native fish. Similar barriers are being installed in the Santa Cruz River in Pima County upstream of the CAP terminus (north of Green Valley). Although barriers may succeed in halting mature fish, they are less useful in addressing microscopic life, such as the spread of chytrid fungus through movement of introduced infected amphibians. The USFWS is also concerned that any open bodies of water may serve as attractants to people, who knowingly or unwittingly dump unwanted aquarium plants and animals in them.

Non-native birds including English sparrow, European starling, rock dove, and, more recently, the Eurasian collared dove (*Streptopelia decaocto*) are widespread in the vicinity of urban, suburban, and agricultural lands throughout Pima County (Tucson Bird Count 2009). Increased availability of food and water associated with development is correlated with higher levels of non-native species in undeveloped lands near developments. The relationship between urbanization in the Tucson basin and non-native bird species has been well-documented in the Tucson area (Emlen 1974; Tweit and Tweit 1986; Germaine et al. 1998; Tucson Bird Count 2009).

Other problematic species include feral dogs and cats that can kill or wound native lizards, rodents, and birds. Feral dogs have killed and wounded desert tortoise in Saguaro National Park (Grover et al. 1995). Feral dogs also serve to spread parasitic worms, giardia, tick fever, and rabies into wild mammal populations. Feral dogs are a well-documented problem in the Las Cienegas National Conservation Area, in the San Xavier District of the Tohono O'odham Nation, on ranch lands, and elsewhere. Feral cats are especially problematic at the urban/wildlife interface, in large part because there are no leash laws as there are for dogs, and nothing limits their hunting from extending into public preserves and natural areas. Feral pigs have been found along the San Pedro River in Pima County.

3.3.5.3 Invasive Species Management in Pima County

Many government agencies, non-profit organizations, and volunteer groups are involved in efforts to control the entry, establishment, and spread of invasive species in Arizona. Current efforts exist at Federal, State, and local levels and are described in detail in Pima County 2002b. Additional efforts related to the control of invasive species in Pima County include the Southern Arizona Buffelgrass Strategic Plan (Buffelgrass Working Group 2008) and the Arizona Invasive Species Management Plan (Arizona Invasive Species Advisory Council 2008).

In general, the establishment of invasive species tends to follow human activities such as land clearing; construction of transportation and utility corridors, as well as hiking trails; and disturbance related to off-road vehicle use. Escape of non-native landscape

plants from both public and privately owned lands is also an important source of invasive species introduction. It is difficult—if not impossible—to effectively address the rapid increase in the introduction and spread of invasive species in Pima County. Very little baseline information is available for use in formulating effective management plans, and most of what is available is anecdotal. For example, current maps of the locations and extent of colonization of invasive species are largely lacking. Of all the identified problematic species, maps of colonization by invasive aquatic fauna is perhaps the most developed, in part because the number of susceptible perennial water bodies and ponds is relatively small in Pima County. Recently, however, a large-scale effort to map buffelgrass invasion in the Sonoran Desert has been implemented and some areas, particularly along roadsides, have been mapped.

3.3.6 Pima County Regulatory Framework

3.3.6.1 Maeveen Marie Behan Conservation Lands System

As noted earlier in this document, the foundation of the Pima County MSCP and SDCP is the CLS. This landscape-scale categorization of land has been based upon a detailed compilation of mapped information on Special Elements, PVS, and other factors. The CLS was developed to serve as a spatial tool to guide Pima County and other agencies and jurisdictions in planning efforts to meet the biological goal of the SDCP: to ensure the long-term survival of the full spectrum of plants, animals, and biological communities that are indigenous to Pima County. The CLS is a reserve system that identifies those areas in Pima County that are essential for accomplishing this goal and places them into land categories. The CLS is now being used as a tool to guide the location of development-related activities.

The CLS land categories are as follows:

- Important Riparian Areas
- Biological Core Management Areas
- Scientific Research Areas
- Multiple Use Management Areas
- Special Species Management Areas
- Agricultural In-holdings within the CLS
- Critical Landscape Connections
- Existing Development within the CLS
- Other Mapped Riparian Areas

The CLS categories are summarized below and shown on Figure 2.3.

3.3.6.1.1 Important Riparian Areas

Important Riparian Areas are defined by mesoriparian and xeroriparian vegetation, high (relative to adjacent uplands) water availability, denser vegetation, and high biological productivity. In addition to the inherent biological value of these water-related vegetation communities, Important Riparian Areas and the adjacent uplands provide a framework for linkages and landscape connections. These riparian areas are fundamental elements of the CLS, and Pima County is working to protect, restore, and enhance the structure and functions of these areas, including hydrological, geomorphic, and biological functions.

3.3.6.1.2 Biological Core Management Areas

Biological core management areas are of very high biological importance distinguished by high potential habitat for five or more PVS and Special Elements (e.g. caves, perennial streams, cottonwood–willow forests). Land uses and management within these areas focus on conservation, restoration, and enhancement of natural communities, with provision for other land uses that are consistent with improvement of conditions for native species, soils, and native vegetation.

3.3.6.1.3 Scientific Research Areas

The scientific research areas currently being managed for scientific research are the Santa Rita Experimental Range and the University of Arizona Desert Laboratory (at Tumamoc Hill). Land uses and management within these areas focus on balancing conservation, restoration, and enhancement of natural communities in support of scientific research on the environment and natural resources (e.g., monitoring ecological change, measuring effects of experimental grazing methods).

3.3.6.1.4 Multiple Use Management Areas

Multiple use management areas are generally defined by the occurrence of high potential habitat for three or more PVS and Special Elements (e.g., caves, perennial streams, cottonwood-willow forests). Land uses and management goals within these areas focus on balancing conservation, restoration, and enhancement of natural communities with other uses compatible with the maintenance of biological values. Land uses appropriate for these areas must be consistent with maintaining open space, natural vegetation, and wildlife habitat values.

3.3.6.1.5 Special Species Management Areas

Special species management areas are defined as crucial for the conservation of specific plants or wildlife species of special concern to Pima County. Land uses and management within these areas will focus on conservation, restoration, and enhancement of habitat for these species.

3.3.6.1.6 Agriculture In-Holdings within the CLS

Agriculture in-holdings are areas identified as having existing or abandoned agricultural uses. Agriculture provides greater permeability than higher intensity land uses for many wildlife species. Changes in land uses in these areas may impact the conservation effectiveness of adjacent or nearby CLS lands.

3.3.6.1.7 Critical Landscape Connections

Critical landscape connections are broadly defined areas that contain potential or existing barriers that tend to isolate major conservation areas. Specifically, these regional-scale areas are located: (1) across the Interstate 10/Santa Cruz River corridors in the northwest, (2) between the Catalina and Tortolita mountains, (3) across the Interstate 10 corridor along Cienega Creek in the east, (4) across the Interstate 19 and Santa Cruz River corridors in southern Pima County, (5) across the Garcia strip extension of the Tohono O'odham Nation, and (6) across the CAP canal in Avra Valley. Habitat loss and fragmentation by roads, other infrastructure, and housing and commercial development pose major challenges to wildlife movement in these areas, and high priority should be given to identifying, preserving, and re-connecting habitat linkages.

3.3.6.1.8 Existing Development within the CLS

Existing development areas are those within the CLS that are identified as having existing development that could be intensified under existing zoning. Changes in land uses in these areas may impact the conservation effectiveness of adjacent CLS lands.

3.3.6.1.9 Other Mapped Riparian Areas

Other mapped riparian areas are regulated by Pima County for purposes of protecting a limited resource, preserving areas of groundwater recharge, promoting improved quality of surface water, reducing erosion, and providing an ecologically sound transition between riparian areas and areas of development. Because these mapped riparian areas also significantly contribute to those biological, hydrological, and geomorphological functions that sustain the health of Important Riparian Areas; Pima County is working to protect, restore, and enhance the structure and functions of these mapped riparian areas. Pima County RFCD has updated its riparian maps to reflect new information generated during the SDCP planning process.

Pima County has adopted general land-use and conservation guidelines associated with each of these land categories with which requests for rezonings and certain use permits must now comply. (See SDCP reports listed under Pima County in Chapter 8 for sources of detailed description of how the CLS was developed.)

3.3.6.2 Other County Regulations and Planning Processes Affecting Biological Resources

Pima County has a number of ordinances and regulatory tools that have been developed over the last several decades. These regulations are triggered by some type of land use-related request or permit and are intended to achieve urban development that is economically viable and compatible with the County's natural, cultural, and aesthetic resources. Currently, these regulatory tools are periodically reviewed as situations and needs arise. Examples of existing environmentally related regulations that directly affect biological resources include the following:

- Site Analysis Requirements for Rezoning and Certain Use Permits
- Hillside Development Zone Ordinance
- Buffer Overlay Zone Ordinance
- Native Plant Preservation Ordinance
- Conservation Subdivision Ordinance
- Grading Ordinance
- Landscape Ordinance
- Riparian Protection & Mitigation Requirements
- Protected Peaks and Ridges Ordinance

In addition to these and other regulations, Pima County has adopted a number of policies and planning efforts that are intended to benefit the environment. Among these policies is one requiring examination of the impacts that groundwater development associated with land-use plan amendments and rezonings will have upon groundwater-dependent ecosystems. Under Pima County's Sustainability Resolution 2007-84, Pima County resolved to maximize County water resources assets to sustain and protect the County's natural environment.

3.4 Visual and Scenic Resources

3.4.1 Physical Parameters of Visual Quality in Pima County

The physical landscape, climate, and diversity of biotic communities described in previous sections all contribute to the visually rich environment of Pima County. The scenic landscape provides opportunities for sightseeing and is frequently cited as one of the main reasons why people are attracted to living in and visiting Pima County.

The regional landscape is typified by broad, sweeping vistas towards a distant and irregular horizon. Pima County is included in the Basin and Range Geologic Province, and is characterized by isolated, rugged, and often steep-walled mountains that dominate the visual landscape. Their presence is underscored by the relatively level to

gently rolling terrain of the inter-mountain valleys. From a distance, the valley floors often appear nearly flat, although watercourses and ridges that create a fairly rugged terrain dissect them. The contrast in soil colors between the darker volcanic mountains and the lighter colors of other mountains and foothills, and vegetation creates visual interest in the landscape, regardless of time of day or seasonal variations in vegetation cover.

The mountains of central and western Pima County are lower and less pronounced than those in eastern Pima County, and their valleys are flatter. This brings more attention to the scenic attributes of the low hills and rock outcrops that occur there.

Pima County's visual qualities are based in part on the sheer variety of vegetation, from saguaros, to cottonwood-willow galleries, oak woodlands, and pine forests. Plant communities include the Sonoran desertscrub (Lower Colorado River Subdivision and Arizona Upland Subdivision), semi-desert grasslands, and oak and pine woodlands found at higher elevations in sky islands (Whittaker and Niering 1965; Brown 1982; Niering and Lowe 1984). The signature columnar cactus of the Sonoran Desert is the saguaro, which grows in mid- to lower elevations, particularly on rocky north-facing slopes. Organ pipe columnar cacti also occur in the only part of their range that extends into the United States at Organ Pipe Cactus National Monument. In the Sonoran Desert, the Arizona Upland Subdivision is associated with higher elevations and higher precipitation than found in the Lower Colorado River Subdivision. Vegetation is structurally taller, denser, and more diverse, which provides habitat for a wide variety of species. The upper elevation interface of this community with the semi-desert grassland and evergreen woodland communities also provides for a rich diversity of species.

Although plant species are similar to those found in the Arizona Upland Subdivision, higher temperatures and lower precipitation result in more open and simple vegetation growth in the Lower Colorado River subdivision. Competition between plants for scarce water resources is intense. Topographic relief is generally low, and sheet flow during the monsoon season is common. In the most arid parts of the County, vegetation is sparse or absent, and a single layer of tightly packed pebbles, often referred to as "desert pavement," covers the soil. The open, sparsely vegetated areas do not support a diverse range of species, but they are visually striking in their expansiveness.

The semi-desert grassland community is a perennial grass-scrub dominated landscape that lies between the desertscrub and the evergreen woodland of higher elevations. Precipitation is similar to that of the adjacent Sonoran desertscrub. These grassland areas have their own scenic quality and historic ranch character. Many of the grasslands are biologically rich, high in scenic values, and lie within private ranch holdings, leased grazing areas, the Buenos Aires National Wildlife Refuge, and Las Cienegas National Conservation Area.

The Madrean evergreen woodlands, characterized by a variety of evergreen oaks and junipers, begin at the upper elevations of the semi-desert grassland and extend to the

upper conifer forests. The terrain in these areas is more complex and precipitation is higher than at lower elevations. These landscapes are an important visual element of Pima County. They are green and cool in the summer, offer rare glimpses of fall color in autumn, and are often snow-covered in winter. Their high scenic value is directly associated to high levels of outdoor recreational uses, regardless of season.

One of the most noticeable visual elements is the relatively undeveloped nature of many areas in Pima County, particularly portions of Avra and Altar valleys, the San Pedro River Valley, and most of western Pima County. This is due in large part to the extensive land holdings of Federal land management agencies and of the Arizona State Land Department (Figure 3.6).

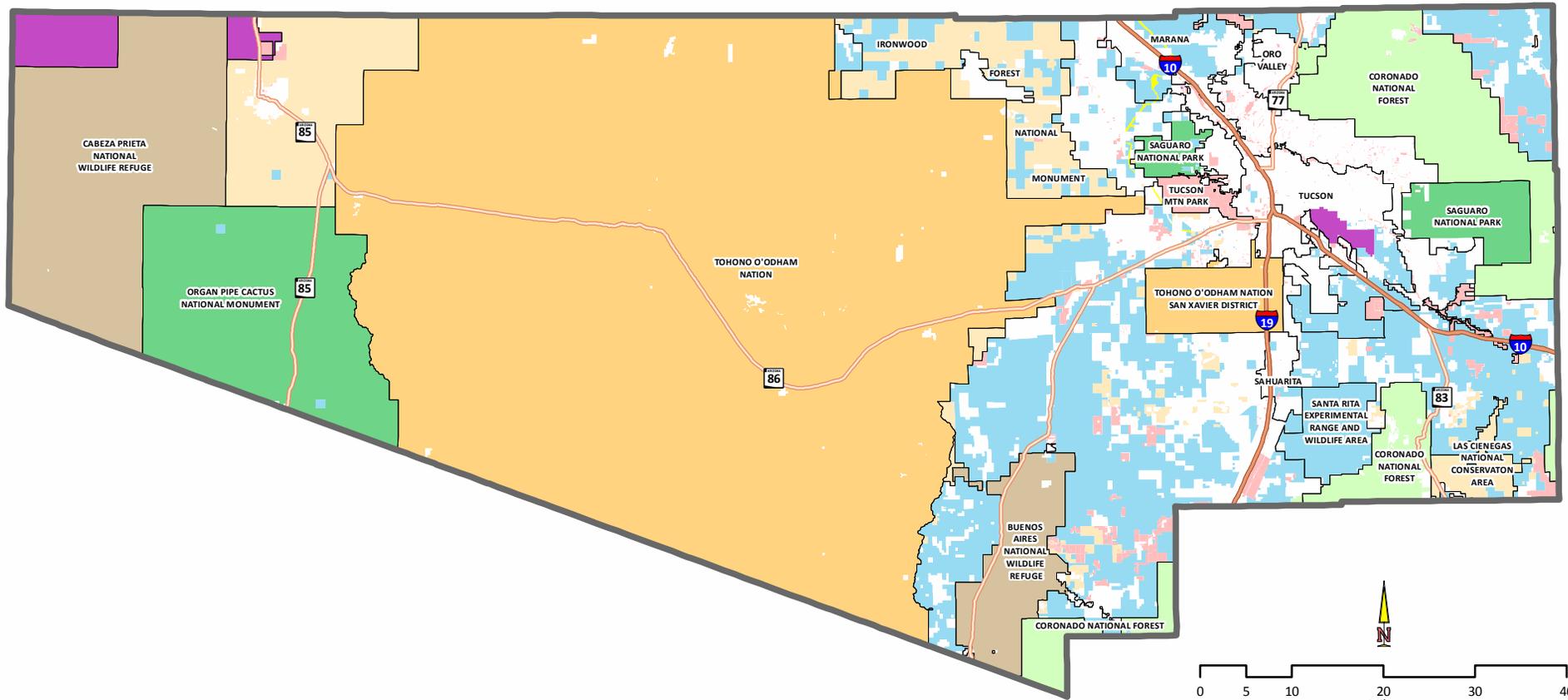
Another noticeable visual element is the clarity of the air and relative lack of air pollution and particulate hazes found in the Tucson basin as compared to the Phoenix metropolitan area. This allows for views of distant mountains and landforms most days of the year. The climatic influences result in dramatic rainstorms, cloud formations, and colorful sunsets. Pima County's landscape and "skyscape" provide an ever-changing scenic resource.

3.4.2 Regulatory Context

3.4.2.1 Visual Quality Management

3.4.2.1.1 National Standards

Several Federal agencies have developed protocols for assessing and protecting the visual quality of their projects and lands. The Federal land management agencies that have land holdings in Pima County and use a standardized system for managing visual resources within their jurisdiction include BLM, the National Park Service, and the U.S. Forest Service (USFS). The Federal Highway Administration also uses visual quality standards. The various visual resource management systems that these agencies employ establish a process by which visual resources on Federal public lands are classified, mapped, evaluated, and managed. The goal of these standards is to avoid, minimize, or mitigate any negative visual impacts that may be associated with proposed land uses and/or improvements. In some cases, the analyses call for enhancement of certain areas. For any given project, the landscape character is defined, scenic quality is rated, the capability of the landscape to absorb cultural modifications is identified, and visual impacts are determined. The evaluation takes into account the distance the project is most often viewed from and the sensitivity level of most viewers. Non-designated lands, such as BLM lands identified for disposal, are typically assigned the least restrictive standards, while areas such as designated wilderness areas must conform to the highest standards of visual quality.



0 5 10 20 30 40
Miles
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- | | | | |
|---|---|--|---|
|  Bureau of Land Mgmt. |  Fish and Wildlife Service |  Pima County |  Tribal Land |
|  Bureau of Reclamation |  Forest Service |  Private Land | |
|  Dept. of Defense |  National Park Service |  State of Arizona | |

Figure 3.6
Land Ownership
in Pima County

Although these Federal standards do not apply to lands under Pima County's jurisdiction and Federal lands are not covered by the Pima County MSCP, Federal agencies are cooperating partners with the County's long-term implementation through their involvement in the SDCP. The commitment to visual quality on Federal lands directly affects the scenic quality of Pima County.

3.4.2.1.2 Local Standards

Pima County's standards for visual quality in public and private projects are expressed indirectly through ordinances and policies pertaining to grading, landscape, native plant preservation, hillside development, peaks and ridges, buffer overlay, conservation subdivision, and site-analysis requirements. These affect visual quality of the built environment by controlling the amount and extent of clearing and grading of natural areas, establishing minimum requirements for setting aside natural open space, revegetating disturbed areas, and controlled excessive dust.

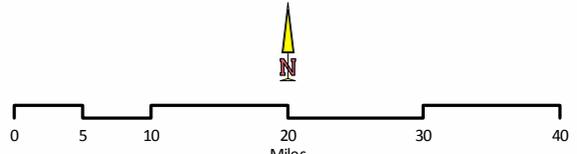
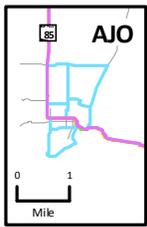
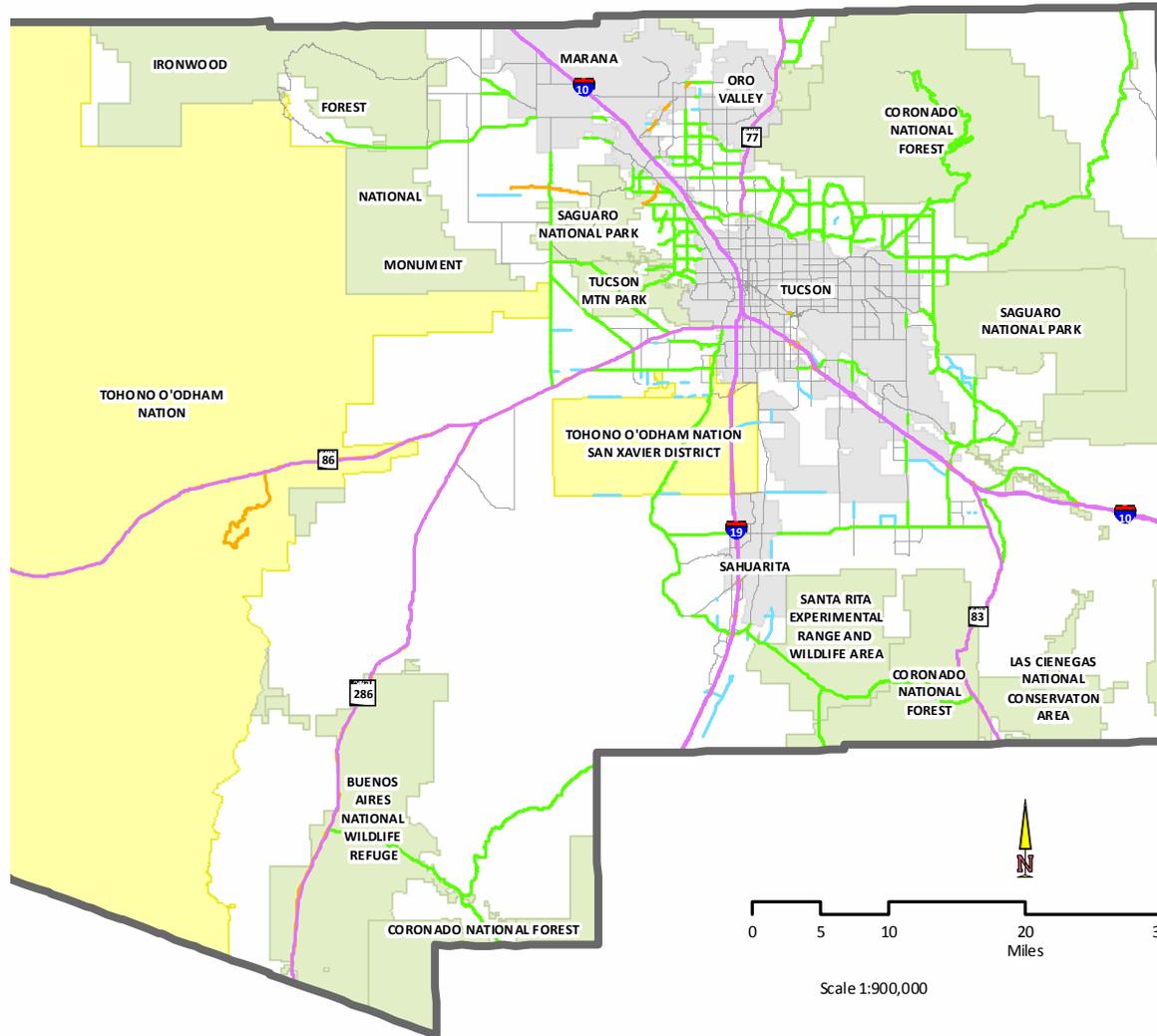
Pima County, the City of Tucson, and the Town of Marana have prioritized the importance of visual quality as it relates to dark skies. Tucson and Pima County first adopted outdoor lighting ordinances in 1972 in an effort to provide standards so that night lighting did not interfere with nearby astronomical observatories without jeopardizing public safety and security. This is important for residents, star gazers, as well as astronomers who come to this area from all over the world to use the Kitt Peak, Mt. Hopkins, University of Arizona, and Mt. Lemmon observatories. Astronomy and optics are an important component of the local economy. The Tucson/Pima County Outdoor Lighting Code is implemented through the development and building permit process. Visual quality and scenic resources are also addressed by Pima County ordinances affecting scenic routes and gateway points (discussed below).

3.4.2.2 Scenic Road Designations

3.4.2.2.1 Pima County Scenic Routes and Gateway Points

Recognizing the importance of visual quality to residents and visitors, Pima County has designated a network of roadways as scenic routes (Figure 3.7) and has established development standards for adjacent projects. The scenic route status is based on visual access to scenic resources, such as unique and significant views of mountains, vegetation, architecture, site design, and geologic formation that help define the community's character. Pima County has evaluated existing scenic routes for potential changes.

The goal of Pima County's scenic route standards is to preserve and enhance the visual resources of the natural and built environment adjacent to scenic routes. The standards affect site design, building heights and setback, preservation of vegetation, landscaping, colors, materials, utilities, signs, and other project elements. Similarly, Pima County



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-  Scenic, Not Major Route
-  Scenic, Major Route
-  Major Route
-  Other Streets
-  State or Interstate Route (State Routes are Scenic Routes)
-  Incorporated City or Town
-  National Forest or Natural Preserve
-  Tribal Land

Figure 3.7
Major Streets and Scenic Routes

establishes standards for gateway points to the Tucson basin using the Gateway Overlay Zone. The requirements of this ordinance serve to protect the scenic quality of entry points to metropolitan Tucson and nearby public preserves. The scenic resources of concern include unique and significant views of mountains, vegetation, architecture, site design, and geologic formations.

The primary objectives of Pima County's scenic route standards are to reduce the visual impact of development on scenic vistas and entry points, to provide design guidelines and require more intensive restoration of graded areas, to provide an appropriate visual transition between natural preserves and more urbanized areas through the implementation of screening or siting of developmental elements, and to protect and enhance the unique character of Pima County.

3.4.2.2 State Parkways and Scenic Roads

The Arizona State Parks Board has administrative authority and responsibility for designating parkways and scenic roads. Arizona Revised Statutes (ARS) 41-512-518 provides for the establishment of parkways and the Parkway, Historic and Scenic Roads Advisory Committee provides for the development of criteria and recommendations for designation of highways and roads with unique, scenic, or historic resources to the Arizona Transportation Board.

The Patagonia–Sonoita Highway (State Route 83) was the second highway in Arizona to be designated a state scenic road. It is located in southeastern Pima County, extending south from Interstate 10 between the Empire and Santa Rita Mountains into Santa Cruz County, ending at Nogales, Arizona. The northern 18 miles of this scenic road is within Pima County. This segment crosses through the Las Cienegas National Conservation Area and the Coronado National Forest and provides views of and access to rolling grasslands and the riparian corridor of Cienega Creek, as well as the juniper-oak foothills and canyons on the east face of the Santa Rita Mountains. The Patagonia-Sonoita Highway was designated for the scenic quality of its sweeping open vistas of semi-desert grasslands, oak woodlands and mountainous sky islands, its archaeological richness, historic qualities, and ranching character. It is vulnerable to rapidly developing urban areas and mining proposals.

Many agencies and entities manage resources along this scenic road. The Coronado National Forest, the BLM, Arizona State Parks, Arizona State Land Department, Pima County, and private landowners have all been participating in the formulation of the Corridor Management Plan and are represented by the Parkways, Historic, and Scenic Roads Advisory Committee, which is responsible for implementing the Corridor Management Plan to ensure that objectives are met by all participants.

The visual resource objectives of the Corridor Management Plan are to:

- protect biotic communities along the scenic road, especially the unique riparian habitat and grasslands, and the flora and fauna they support
- protect the watersheds with a focus on streams and riparian areas along the scenic road
- protect the beautiful vistas and open spaces experienced along the scenic road, including clean air and starry nights, and minimize visual inconsistencies that detract from the area's rural and natural character

The Bar V Ranch contains a very significant riparian corridor that includes natural springs. The area's scenic quality was a primary consideration in Pima County's petition to the State Land Department to grant funds for property acquisition for the purposes of long-term conservation.

Parkways are scenic and/or historic roads with controlled or limited access from local roads. The Sky Island Scenic Parkway (also variously known as Mt. Lemmon Highway and Catalina Highway, and the Sky Island Scenic Byway) was designated in 2001 and winds 27.2 miles through the Santa Catalina Mountains of the Coronado National Forest. The parkway traverses five different life zones, from the Sonoran Desert at the base to mixed conifer forest at the top (Whittaker and Niering 1965; Niering and Lowe 1984). Important visual resources include rock spires, boulder stacks, sheer cliff faces, and long vistas down to the desert floor. This parkway is under USFS jurisdiction.

3.4.2.2.3 National Scenic Byways

The National Scenic Byways Program was established with the Intermodal Surface Transportation Efficiency Act of 1991 and continued with the Transportation Equity Act for the 21st Century. This program recognizes and protects roads that have outstanding scenic, historic, cultural, natural, recreational, and archaeological qualities, and supports state scenic byway initiatives. The Sky Island Scenic Byway (which is also the Sky Island Scenic Parkway) is the only national scenic byway in Pima County.

3.5 Air Quality

This section discusses regional air quality conditions related to the SDCP and MSCP in terms of the regulatory framework and monitoring efforts in Pima County. Information here is based on Pima County reports prepared for the SDCP and the Pima County Comprehensive Plan, and on information from Pima County Department of Environmental Quality (PDEQ) and PAG.

3.5.1 Regulatory Context

3.5.1.1 Federal Clean Air Act

The Federal Clean Air Act (CAA) of 1970 is the law that protects and improves the nation's air quality. Failure to meet the requirements of the CAA can result in economic sanctions and/or civil lawsuits. The Federal agency regulating air quality is the EPA. The EPA authorizes states to implement much of the CAA. In Arizona, this authority is delegated to each county. The PDEQ is the local air pollution control agency. PDEQ regulates most air pollution sources and monitors the ambient air quality of the region. PDEQ works with PAG to address regional air quality issues. Criteria pollutants monitored under the CAA include carbon monoxide (CO), particulate matter (PM₁₀ and PM_{2.5}), ozone (O₃), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), and lead. These pollutants can impair human health, and harm the environment. Tucson is in attainment for all criteria pollutants. Pima County is also in attainment for all criteria pollutants.

The CAA also addresses the need to maintain clean air in protected natural areas, such as the wilderness areas, national parks, and forests surrounding Tucson. Portions of Saguaro National Park (adjacent to both the eastern and western boundaries of the Tucson metropolitan area) contain the Congressionally designated Saguaro Wilderness, which is a Class I area. Class I areas were designated based on an evaluation required by Congress in the 1977 Federal CAA amendments. The evaluation, which the USFS and National Park Service performed, reviewed the wilderness areas of parks and national forests, which were designated as wilderness before 1977, which were more than 6,000 acres in size, and which had visual air quality as an important resource for visitors. Both PDEQ and ADEQ participate in national monitoring efforts of the Saguaro National Park Class I areas.

3.5.1.2 Pima County Comprehensive Plan

Air quality is one of the environmental planning elements of Pima County's Comprehensive Plan. The plan includes strategies for maintaining air quality and ensuring compliance with Federal air quality standards. Among these strategies are the following: coordinating with land management agencies on prescribed burns, implementing measures to maximize transportation system capacity, paving dirt roads, and promoting land use decisions that encourage clustering land uses to promote trip reduction.

3.5.2 Regional Context

Air quality is influenced by meteorologic and climatic factors such as wind direction. Topographic conditions of the Tucson Basin affect the area's air quality, particularly during the winter months. In Pima County, wind direction generally tends to be down-valley (from the southeast to the northwest) at night and early morning hours, reversing

to the up-valley direction (from the northwest) during the day. Higher levels of pollution can occur in the winter when the air is most calm and a temperature inversion exists. Vehicle emissions increase with traffic volume in the early morning and remain close to the ground because there is little mixing. As the sun rises in the morning and heats the ground, mixing occurs and disperses the built-up pollutants. These conditions are most common during the winter, but occasionally can occur in the summer as well.

Air pollution has well-documented health implications and can also degrade scenic quality. The visibility of mountains and other scenery can be impaired by regional haze caused by pollutants and airborne particulate matter.

Improved automobile emission controls and fuels, and the state-mandated vehicle emissions inspection program have reduced pollutant levels, particularly CO, below the higher levels observed during the early to mid-70s.

The following discussion briefly summarizes conditions of pollutants monitored by Pima County.

Carbon monoxide: The Tucson area generally has higher CO readings in the winter months due to stagnant air conditions in the colder mornings. The CO cannot mix due to stagnant air and tends to build up, especially near congested intersections. CO concentrations have decreased considerably over the past 10 years, primarily due to newer, cleaner burning vehicles and the use of oxygenated fuels. Based on annual ambient air quality monitoring and reporting results, the Tucson area has not exceeded Federal standards for CO since 1988. Levels of CO are likely to increase in the future due to the expected population increase and subsequent motor vehicle use. Based on current air quality and future projections, however, there is a low likelihood of violation against the national standard in the future.

Ground-level O₃: The increase in CO may lead to an increase in O₃ levels since the major source of O₃ precursors is motor vehicle emission. The EPA strengthened the O₃ standard in 2008 to make the National Ambient Air Quality Standards (NAAQS) more protective of human health and, under the current Federal administration, has decided to modify the standard again. O₃ concentrations are the highest in the summer months in the afternoons due to the intense sunlight and heat, and generally decline after sunset because the photochemical reactions necessary for the production of O₃ cease. There have been no violations or exceedances of O₃ since 1982.

Particulate matter: There was a NAAQS exceedance of PM₁₀ in 2009. Despite this exceedance and a violation in 1999 of PM₁₀ levels, Pima County is still in attainment, because the exceedances were flagged as natural events and because of Natural Events Action Plan, which was developed to decrease levels of PM₁₀. Scientific studies have linked breathing particulate matter to a series of significant health problems, including aggravated asthma; increases in respiratory symptoms such as coughing and

difficult or painful breathing; throat irritation, chronic bronchitis; decreased lung function; and premature death. The PDEQ issued a High Pollution Advisory in July of 2009, because PDEQ monitoring sites recorded elevated particulate matter pollution levels. An advisory is an indication of air pollution reaching a level where individuals with lung or heart disease may experience respiratory symptoms.

Pima County also monitors PM_{2.5}. The smaller particles travel deeper into the lungs and can be more harmful than PM₁₀, can be composed of toxic substances such as metals and organic compounds, and have been linked to health concerns including respiratory and heart problems. PM_{2.5} can also contribute to poor visibility and urban haze. There have been no exceedances of the NAAQS for PM_{2.5} since monitoring began in 1999.

Nitrogen dioxide and sulfur dioxide: Currently, Pima County is in attainment for NO₂ and SO₂. Levels are well below Federal standards, and it is not anticipated that these levels would violate NAAQS standards in the future.

Lead: Lead monitoring was discontinued in March 1997. The EPA regulations allowed for the cessation of ambient lead monitoring in most of the country, including Pima County, due to decreasing levels of lead in gasoline and lack of a stationary point source for lead pollutants. In October 2008, EPA strengthened the lead standard as research has shown that adverse health effects occur at much lower levels of lead in the blood than previously thought. Pima County has been operating a lead monitoring site since the beginning of 2011.

Odors: Pima County is currently studying and implementing methods of reducing odors at the 11 wastewater treatment plants and 4 County-operated landfills.

Regional haze and visibility impairment: Although particulate matter has been at acceptable levels, wildfires in recent years have caused temporary, but greatly reduced, visibility. The Aspen Fire in the Catalina Mountains during the 2003 summer caused regional haze and impaired visibility for many days while it burned. Prescribed burns can have similar effects for shorter periods.

3.5.3 Current Air Quality Conditions

Based on PDEQ monitoring of ambient air quality, O₃ levels in Pima County have remained very close to the EPA health standard. Elevated levels occur during summer months when chemical reactions of emissions from vehicles and industrial processes react in the presence of sunlight to create O₃.

Particulates in the air are primarily the result of earth-disturbing activities, road travel and burning fuel. Pima County efforts to reduce particulate concentrations have included paving unpaved streets and roads, reducing allowable speeds on the remaining unpaved roadways, and enacting and enforcing strict dust control levels at construction sites.

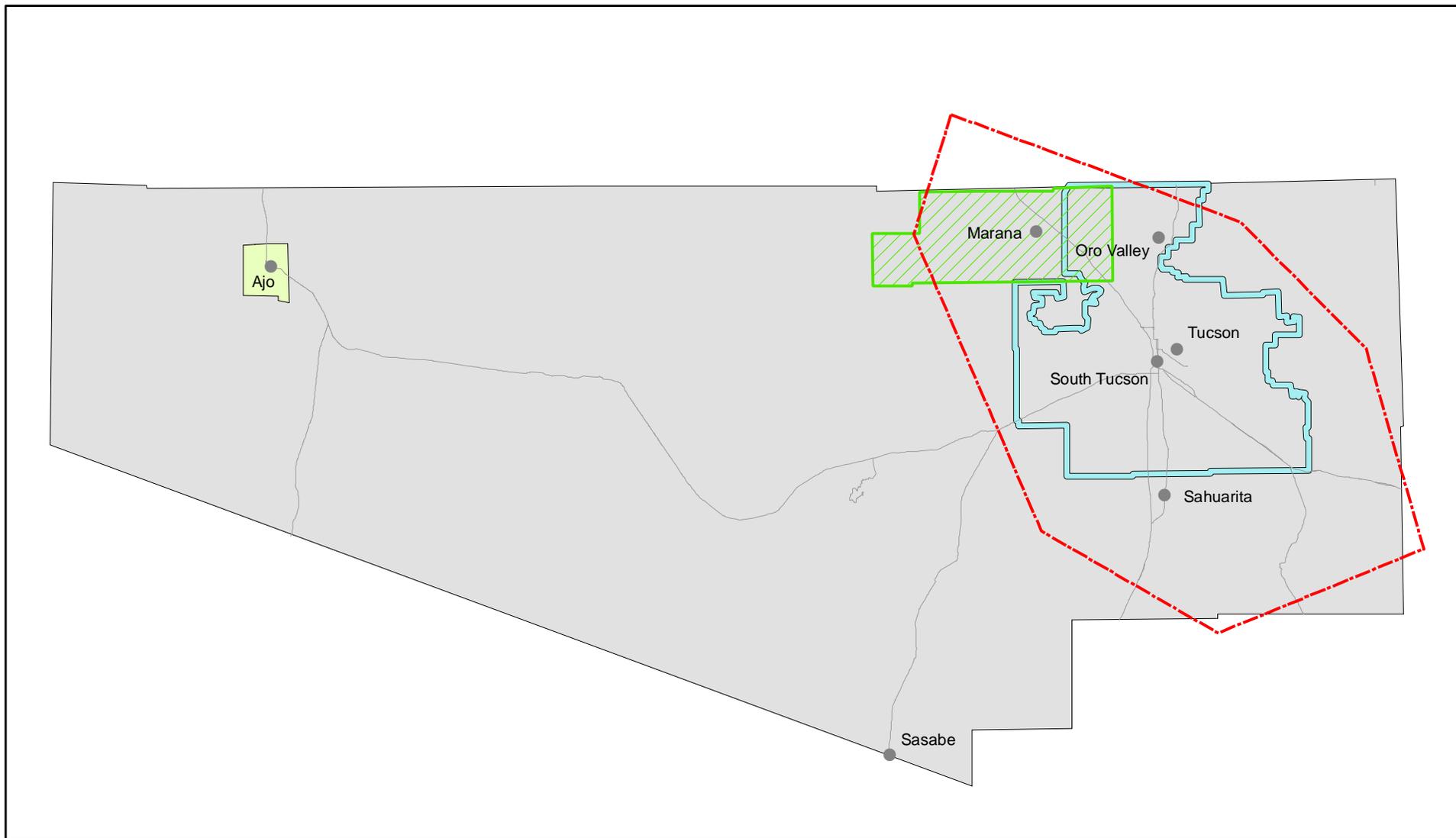
Most of Pima County's residents live in eastern Pima County, primarily within the Tucson basin and along the Santa Cruz River basin south to Green Valley and north to Marana. With this concentration of population, the potential for air quality problems is greater in eastern Pima County than in the central or western portions of the County. Designation of air planning areas established by the State and with approval by EPA considers key factors including emissions, traffic and commuting patterns, population density and expected growth, and is only approximate. There are two designated air planning areas in eastern Pima County, the Rillito Planning Area and the Tucson Air Planning Area, and one in western Pima County, the Ajo Planning Area (Figure 3.8).

The Rillito Planning Area, located in the area northwest of Tucson with a northern boundary on the Pinal County line, was established following the CAA amendments in 1990 to address nonattainment of PM_{10} . The source of PM_{10} emissions include the Arizona Portland Cement Company, construction activities, unstabilized river banks, agriculture, and dust from unpaved roads and unstabilized road shoulders. Based on several years of air quality data that were below the National Ambient Air Quality Standards, in October 2006 the EPA determined that the Rillito Planning Area met the text for redesignation to attainment. A State Implementation Plan (SIP) Revision was submitted to the EPA in 2008 to redesignate the area to attainment.

The Tucson Air Planning Area spans metropolitan Tucson and the surrounding area and was also established following the CAA amendments in 1990 to address nonattainment for CO due to vehicular emissions. The ADEQ submitted a CO Limited Maintenance Plan to the EPA in 1996 and an amendment in 1999, and the area was redesignated to attainment for CO in 2000. A SIP Revision was approved by EPA in 2009 for continued attainment for CO through 2020.

The Ajo Air Planning Area is currently designated as nonattainment for PM_{10} . Emission sources for PM_{10} include the dry, unstable conditions of tailings piles, paved and unpaved roads, and cleared areas. The Ajo PM_{10} SIP was submitted to EPA in 1991. Dust control measures implemented include covering the tailings piles with a combination of vegetation and armoring. ADEQ is working on submitting a SIP Revision to have the area redesignated to attainment. The Ajo Area has been designated as nonattainment for SO_2 . Emission sources for SO_2 are related to the Phelps Dodge Ajo, Inc. copper smelter stack and fugitive emissions.

The smelter was dismantled in 1996 and ADEQ submitted a SIP Revision requesting redesignation to attainment in 2002. Ajo was designated an attainment area under a maintenance plan for SO_2 in 2004.



-  Tucson Air Planning
-  Tucson CO Maintenance
-  Rillito Planning Area
-  Ajo PM10/SO2 Nonattainment



FIGURE 3.8
Regional Air Quality Planning Areas

3.6 Climate Change

3.6.1 Regulatory Context

3.6.1.1 Federal Clean Air Act

Title VI of the Clean Air Act was established to protect stratospheric ozone by phasing out the manufacture of ozone-depleting substances and by restricting their use and distribution.

3.6.1.2 U.S. Fish and Wildlife Service Climate Change Strategy

As acknowledged by the USFWS, climate change is a serious challenge that will profoundly affect wildlife and its habitat. The USFWS's *Strategic Plan for Responding to Accelerating Climate Change* establishes a basic framework with which the USFWS will work to help ensure the sustainability of wildlife and habitats in the context of climate change (USFWS 2011).

3.6.1.3 Pima County Sustainable Action Plan for County Operations

Pima County's Sustainable Action Plan for County Operations is a climate change action plan that lays out a strategy, including specific policy recommendations that address climate change and reduce greenhouse gas (GHG) emissions. The Pima County BOS-adopted plan includes elements such as alternative fuels vehicles, green building, renewable energy and energy efficiency, green purchasing, land conservation and management, waste reduction, and water conservation and management.

3.6.2 Regional Context

Climate change refers to changes in the long-term average of climate parameters (such as temperature, precipitation, and wind), generally based on averages of 20 to 30 years. Climate change combined with changes in land use can increase the risk of adverse environmental outcomes for natural communities and species and conversely favor invasive species. The earth's climate is in a constant state of flux, and over geologic time, the earth's climate has experienced periodic warming and cooling cycles. For most of the earth's geologic history, these periods of warming and cooling have been the result of many complicated interacting natural factors. Since the beginning of the Industrial Revolution around 1750, the average temperature of the earth has been increasing at a rate that is faster than can be explained by natural climate cycles alone. The Intergovernmental Panel on Climate Change and the U.S. National Research Council state that climate change is occurring as a result of high concentrations of GHGs in the earth's atmosphere. GHGs include water vapor, carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), chlorofluorocarbons, and ozone. These gases absorb energy

emitted by the earth’s surface, and then re-emit some of this energy back to the earth, warming the earth’s surface and influencing global and local climates. As more and more GHGs are emitted into the atmosphere from human activities such as the burning of fossil fuels, the earth’s energy balance is disrupted resulting in a number of changes to the climate.

Pima County has given careful consideration to the ways that climate patterns can affect their habitat conservation efforts. Drought, flood event intervals, temperature increases, and other variables directly affect biotic health and ecosystem functions in Pima County, as addressed in Pima County’s MSCP and described in *Climate Change and Natural Resources in Pima County: Anticipated Effects and Management Challenges* (Powell 2010). Projected ecological effects on natural resources in Pima County are summarized in Table 3.3.

**TABLE 3.3
ANTICIPATED EFFECTS OF CLIMATE CHANGE ON NATURAL RESOURCES
IN PIMA COUNTY**

Resource	Anticipated Effect(s)
Precipitation	Less average winter precipitation
Primary productivity	Increased productivity in most systems
Wildland fire	Longer fire season and more intense fires
Soils	Increase in carbon loss from soils. Many unknowns remain.
Water absorption/runoff	Variable and unknown. More intense monsoon storms can lead to erosion.
Groundwater recharge	Less rainfall, more intense storms, and an increased demand for water will lead to lower water tables.
Shallow groundwater, seeps, springs, and perennial streams	Less water for these areas and the species that rely on them. This will lead to further degradation of this already endangered resource.
Vegetation communities	Upland vegetation communities will move upslope. Changes will be particularly pronounced at the ecotones, or area of overlap, between communities.
Species	Likely increase in non-native plant species such as buffelgrass. Winter annuals will become less abundant. Moisture stress on plants will increase. Wildlife species will move to appropriate habitats, but some species, particularly at the tops of the Sky Islands, may be lost.
Phenology (timing of flowering, fruiting, migration etc.)	These natural events will change their timing to earlier or later, depending on the species and season. May cause problems with plant/pollinator interactions and climate-driven wildlife behaviors. These effects could become ecologically amplified.

Source: *Climate Change and Natural Resources in Pima County: Anticipated Effects and Management Challenges* (Powell 2010)

3.7 Urban Land Use

This section discusses urban land uses in terms of existing distribution of population, future projections in growth and growth areas, and the regulatory framework for land use

in Pima County. Information here is based on Pima County reports prepared for the SDCP and the 2001 Pima County Comprehensive Plan update and on information from PAG, the City of Tucson, and the Town of Marana.

3.7.1 Distribution of Population and Urban Land Uses

3.7.1.1 Existing Distribution

Most Pima County residents live in eastern Pima County, within the urbanized Tucson basin and along the Santa Cruz River corridor south to Green Valley and north to Marana. Human settlement along this river corridor has prehistoric roots. The topography of the Tucson basin and the patterns of Federal land ownership have also greatly influenced distribution and pattern of the urbanized area.

During the past century, the area covered by the incorporated urban footprint of Tucson has expanded from 2 square miles in 1900, to almost 10 square miles in 1950, to 100 square miles in 1980, to around 200 square miles today. Population levels experienced a steady climb, but the density of residents within a square mile has actually declined from nearly 5,200 in 1953 to around 2,400 persons per square mile today. This translates to an average consumption rate of over 7 square miles each year. Pima County's growth patterns reflect the market forces of leap frog development and unregulated development, both of which have led to fragmentation of the natural resource base and an urbanized footprint spread across the Tucson basin. Low-density platted developments, as well as unregulated lot splitting (also referred to as "wildcat" subdividing), have contributed to sprawl in the County.

Other communities have developed in un-incorporated Pima County, but they are relatively small and mostly rural. Major communities located within Pima County are shown on Figure 3.9. The Town of Ajo, in western Pima County, developed as a mining town with many residents employed by the New Cornelia open-pit copper mine and smelter. Today the town is promoted for its historic context, retirement and artist opportunities, and proximity to national attractions such as Organ Pipe Cactus National Monument. Two towns, Lukeville and Sasabe, are located on the United States/Mexico international border.

The Town of Sells and numerous small villages are located within the Tohono O'odham Nation in central Pima County. Arivaca, Three Points, Redington, and Catalina are small rural towns within 50 miles of Tucson. Summerhaven is a small community located on Mt. Lemmon in the Santa Catalina Mountains.

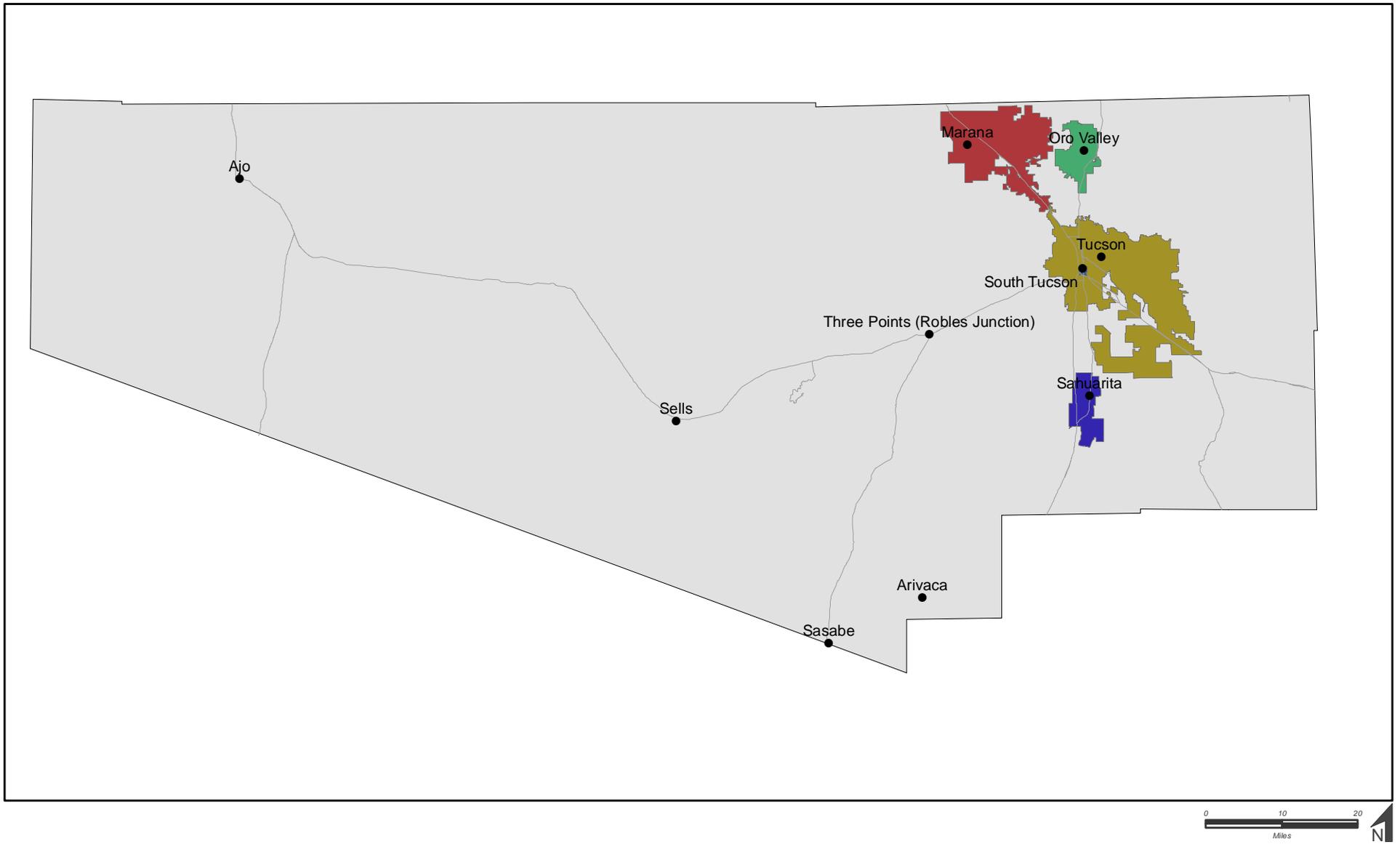


FIGURE 3.9
Incorporated Areas of Pima County

3.7.1.2 Future Growth in Pima County

3.7.1.2.1 Population

The Population Estimates and Projections, published by PAG, estimated Pima County's population at 1,092,369 people for 2011. In 2010, the Census Bureau counted 980,263 persons in Pima County (PAG 2010). Between 2010 and 2020, the population of Pima County is anticipated to increase by roughly 201,189 people, creating the need for over 80,000 new dwellings, assuming an average of 2.5 persons per dwelling. From 2010 to 2040, the population is projected to increase by roughly 515,000 people requiring about 206,000 new dwelling units (Table 3.4).

**TABLE 3.4
PIMA COUNTY POPULATION
PROJECTIONS**

Year	Pima County	Change in Pima County Population
2010	1,070,723	44,217
2020	1,271,912	201,189
2030	1,442,420	170,508
2040	1,585,983	143,563

Source: PAG 2007b, 2010

Of the 100 largest counties in the United States, Pima County was the 26th most rapidly growing from 2000 to 2010 at 16.2 percent. Only 10 counties larger in population grew more rapidly during the same period (PAG 2010).

3.7.1.2.2 Projected Development Area

To project future areas of land development for the purpose of estimating impacts to Covered Species under the proposed MSCP, Pima County staff began by combining population projections from the Arizona Department of Economic Security with data layers from Pima County's GIS library. A GIS suitability analysis was employed to determine those areas most likely to be developed, and the population projections were translated into acreage requirements to determine how much currently vacant land with high development suitability would be absorbed into the built environment (City of Tucson and Pima County 2009). Different allowable population densities were mapped to direct land absorption into urban, suburban, and exurban (the region found beyond the suburbs) land-use categories.

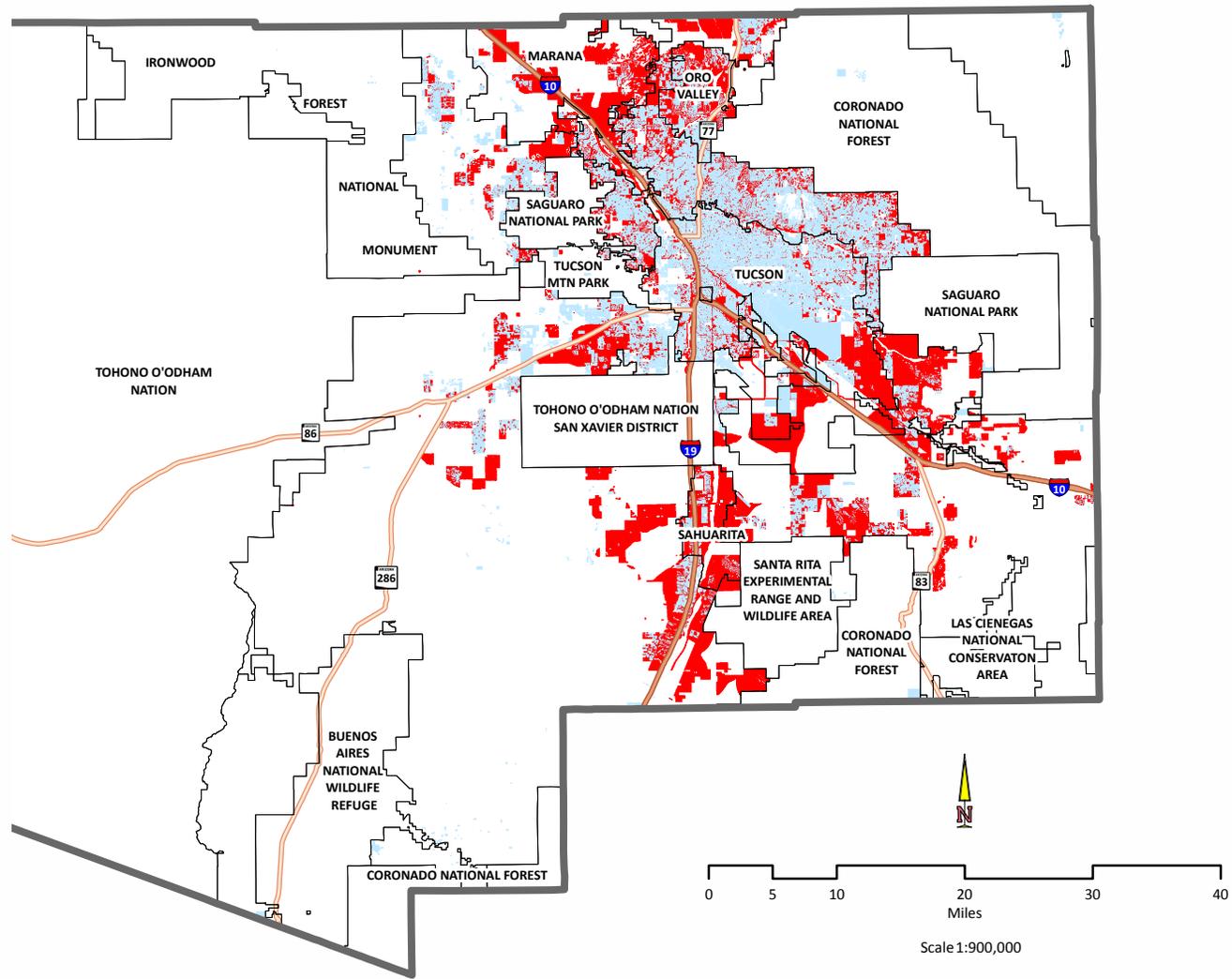
These land-use categories (and associated sub-categories) were drawn from Pima County's Comprehensive Plan and zoning designations, an analysis of building permit issuances over the past decade, and expert input from Pima County planning officials.

The development suitability analysis relied on two types of inputs—factors and constraints. Factors enhance or reduce development suitability on a continuous scale. Factors included distance-based variables such as proximity to existing, committed, and planned infrastructure (e.g., major roads, transit services, water delivery network, and sanitary sewer network), as well as measurements of school district quality and neighborhood stress. Constraints limit alternatives; they mask certain portions of the landscape from consideration. Constraints included, but were not limited to, existing natural preserves, floodways, and areas of high slope. The resulting development suitability map combined with the allowable density mapping and the population projections produced land absorption projections that accounted for both the inevitable growth of the urban-suburban core, as well as low-density leap frog or rural development in the Altar and Avra valleys and far eastern Pima County. The results of this modeling effort are shown in Figure 3.10, which shows both the existing and projected future (30-year) development footprint in eastern Pima County. Further details of this effort can be found in Appendix G of the Pima County MSCP.

3.7.1.3 Future Growth Areas in Marana and Tucson

Rapid development in the northwest area of the Tucson basin has fueled population growth and expansion of the Town of Marana. Marana's history of annexations has increased the total area of the Town to nearly 74,000 acres with an estimated population of 18,000. A significant portion of this area was added in 2002 by the annexation of State Trust lands covering much of the Tortolita fan and foothills. Most of these State Trust lands, which were previously proposed as critical habitat for the pygmy-owl, have been designated as environmentally sensitive lands by the Town of Marana. The Town of Marana expects that future development in this area will emphasize traditional low-density, as well as clustered, residential development. Significant portions of land will be preserved as natural undisturbed open space. Northwest Marana has been identified for receiving a significant amount of Marana's future development over the next 20 years and is one of four growth areas in the Marana General Plan adopted in December 2007. This area includes many acres of previously cultivated agricultural land suitable for development.

In 2001, the City of Tucson annexed over 27 square miles of State Trust lands located in the southeast area of the Tucson basin, an area referred to as the Southlands. Much of the growth in the Tucson basin is to be directed to this part of the city. The southeastern quadrant of the Southlands area is State Trust land that has been identified as "future city growth area" and "evolving edge growth area" under Tucson's General Plan. Approximately 7,500 acres in this region was being planned under the Houghton Area Master Plan, but that effort is currently on hold. Additional annexations by the City of Tucson are anticipated in the Southlands.



- Projected Development Footprint 2040 (172,790 acres)
- Existing Development Footprint 2008 (234,900 acres)
- Administrative Boundary

Figure 3.10
Existing and Projected Development
in Eastern Pima County

3.7.2 Regulatory Context

The Pima County BOS regulates urban land use in unincorporated Pima County. Pima County has the greatest amount of regulatory discretion over requests to intensify existing land uses (e.g. through rezonings, comprehensive plan updates, and conditional use permits) than it does over other types of development. Regulated uses by the BOS can be denied outright or approved with conditions. Once a developer complies with all of the BOS's conditions for approval of these intensifications, they have what is called "hard zoning." At that point, Pima County's approval of a subdivision plat/development plan becomes an administrative action. In other words, if the applicant has fulfilled all the stipulated requirements, then subsequent approvals are mandatory. Pima County has little regulatory control over development on lot splits, and in 1997, development on lot splits was estimated to be approximately 41 percent of private development. On any given parcel, Pima County issues other permits required for conformance with building codes, and Pima County RFCD regulates how development is constructed within flood hazard areas. These permits are purely administrative. In conclusion, the majority of urban development in the Permit Area has been and will continue to occur through administrative (mandatory if all requirements are met), not discretionary approvals.

In September of 2000, the BOS directed staff to undertake an update of the 1992 Pima County Comprehensive Plan and to incorporate the land use concepts, policies, and principles of conservation identified in the draft Preliminary SDCP.

3.7.2.1 Pima County Comprehensive Plan Update of 2001

The current iteration of the Pima County Comprehensive Plan as adopted by the BOS in December 2001, updated the 1992 Comprehensive Plan in accordance with BOS direction so that it conforms to the SDCP and complies with the Growing Smarter acts in Arizona State law. The purpose of a comprehensive plan, as defined in State law, is to conserve the natural resources of the County, to ensure efficient expenditure of public funds, and to promote health, safety, convenience, and general welfare of the public. The 2001 Comprehensive Plan update, as adopted, contains the following seven elements as required by State statute at the time: 1) growth area element, 2) land use element, 3) circulation element, 4) water resources element, 5) open space element, 6) cost of development element, and 7) environmental element. The following discussion reflects the current status of the Pima County Comprehensive Plan update and incorporates amendments made since 2001.

Growth Areas: Three growth areas are identified in the plan, two within unincorporated Pima County (the airport area and the Flowing Wells area) and the third being within the incorporated limits of the City of Tucson. The two unincorporated areas are supplemental to and consistent with urbanizing areas within Tucson, Marana, Oro Valley, Sahuarita, and South Tucson. Pima County's growth areas satisfy the State law requirement that the County have a strategy to make circulation more efficient, conserve

natural resources in coordination with areas outside the boundary, and promote financially sound infrastructure expansion through coordinated development.

Land Use: To accommodate future population growth and carry out the compact form development goals, the 2001 Comprehensive Plan update includes policies on:

- conservation and preservation of cultural resources
- compact development, transfer of development rights, housing
- public services and facilities including wastewater and flood control
- solar energy access

Circulation—Circulation element policies require that transportation infrastructure be developed concurrently with land use development to the greatest extent possible. The infrastructure development needed to meet existing and future traffic demand will be designed in an environmentally or context-sensitive manner to the greatest extent feasible. Multi-modal transportation infrastructure will be further developed to balance the needs of all users and provide viable alternatives to driving where appropriate and to the greatest extent feasible. High density, mixed use development/redevelopment will be promoted along major transit corridors.

Water Resources—Regional plan policies related to water resources recognize that water is a valuable resource in a desert environment and that the use of water resources must:

- promote the efficient use and construction of water-related infrastructure in order to provide for a safe, reliable and renewable water supply;
- increase reliance upon renewable water supplies;
- minimize impacts of water supply development upon existing and future residents of Pima County; and
- protect groundwater-dependent ecosystems of Pima County, including springs, perennial and intermittent streams and shallow groundwater areas.

This policy also dictates that all requests to rezone a property will specify those water conservation measures that must, upon the BOS's approval of the rezoning, be implemented.

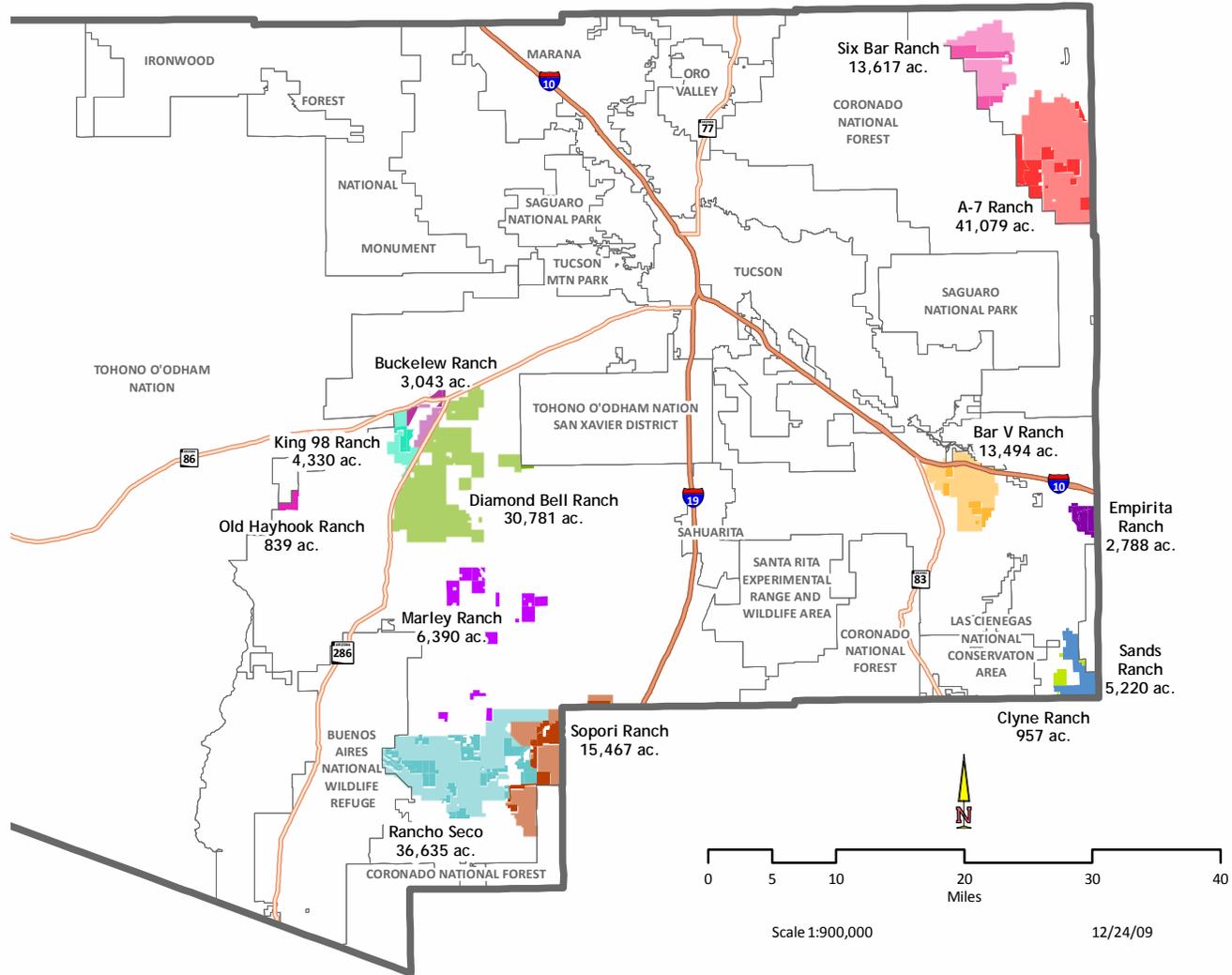
Other strategies relating to conservation of biological resources include the following:

- limiting water pumping near shallow groundwater;
- maximizing use of CAP and reclaimed water;

- limiting human water use in certain areas;
- using CAP water to support riparian areas (this strategy would require that the County have a CAP allocation, or achieve the conservation use of an allocation belonging to others through cooperative initiatives);
- preserving the current discharge and allocation of effluent for riparian restoration;
- restoring and preserving natural areas by floodplain acquisition, purchasing development and water rights, and other methods;
- constructing wetlands, riparian areas, and recharge projects; and
- protecting remote basins and unfragmented and undeveloped areas to maintain natural processes related to water.

Open Space: As constrained by ARS 11-824, neither private nor State land can be designated as open space, recreation, conservation or agriculture unless the County receives the written consent of the landowner or provides an alternative, economically viable designation allowing at least one residential dwelling per acre. This provision limits the open space element to a description of the existing resource base. The Comprehensive Plan 2001 Update identifies this existing resource base to be the mountain parks and natural preserves. Specifically listed are Tucson Mountain Park, Tortolita Mountain Park, Colossal Cave Mountain Park, and Cienega Creek Natural Preserve. Other properties owned by the County, including a number of large and small ranch properties (Figure 3.11) that have been acquired using funds from the 2004 open space bond along with any properties purchased for open space purposes in the future, will need to be assessed for incorporation into this element at such time as the next update occurs.

Cost of Development: Several policies and strategies under this element are intended to ensure that public facilities and infrastructure improvements keep pace with growth and development and that development pays a fair share of public facility costs. Urban Service Area districts would serve as a means of implementing the establishment of Growth Areas and urban areas. These districts will identify where public facilities will be provided in the future and at what levels. Minimum level-of-service standards will be identified for each district. Equitable developer-assessment fees appropriate to each district will be determined by calculating a pro rata share of the total projected infrastructure requirement. In 2007, the BOS adopted the Southwest Infrastructure Plan for an emerging growth area southwest of the City of Tucson. Pieces of the Southwest Infrastructure Plan, including those dealing with sustainability, have been incorporated into the Pima County Comprehensive Plan.



- | | | | | | |
|--|--------------------|--|-------------------|--|--|
| | A-7 Ranch | | Empirita Ranch | | Sands Ranch |
| | Bar V Ranch | | King 98 Ranch | | Six Bar Ranch |
| | Bucklew Ranch | | Marley Ranch | | Sopori Ranch |
| | Clyne Ranch | | Old Hayhook Ranch | | Administrative Boundary |
| | Diamond Bell Ranch | | Rancho Seco | | Where applicable, lease lands are a lighter shade of the color used for fee lands. |

Figure 3.11
Pima County Owned
and/or Leased Ranches

Environmental: Regional plan policies related to the environmental element address water quality and natural resources. These regional policies establish Pima County's CLS. Discretionary actions and land uses approved by Pima County within the CLS (see map of CLS: Figure 2.3) are subject to conservation guidelines whose application strives to protect natural resources according to their relative values described by the following:

- **Important Riparian Areas:** At least 95 percent of the total acreage of lands within this designation shall be conserved in a natural or undisturbed condition.
- **Biological Core Management Areas:** At least 80 percent of the total acreage of lands within this designation shall be conserved as undisturbed natural open space. Land use and management within these areas shall focus on the preservation, restoration, and enhancement of native biological communities.
- **Scientific Research Areas:** These areas should continue to be managed for the purpose of scientific research on the environment and natural resources. Scientific research activities should minimize any long-lasting impacts that may affect adjacent or nearby CLS lands. Any land-use changes subject to Pima County jurisdiction should achieve the conservation goals of the underlying CLS category.
- **Multiple Use Management Areas:** At least 66.66 percent of the total acreage within this designation shall be conserved as undisturbed natural open space. Land use and management within these areas shall focus on balancing land uses with conservation, restoration, and enhancement of native biological communities.
- **Special Species Management Areas:** At least 80 percent of the total acreage of lands within this designation shall be conserved as undisturbed natural open space and will provide for the conservation, restoration, or enhancement of the affected special species (Mexican spotted owl [not a Covered Species], cactus ferruginous pygmy-owl, and southwestern willow flycatcher).
- **Agriculture In-holdings within the Conservation Lands System:** Land-use changes within these areas will emphasize the use of native flora, facilitate the movement of native fauna and pollination of native flora across and through the landscape, and conserve on-site conservation values when they are present. Development within these areas should be configured in a manner that does not compromise the conservation values of adjacent and nearby CLS lands.
- **Critical Landscape Connections:** Land-use changes in these general areas would serve to protect existing biological linkages and attempt to remove barriers and restore fragmented corridors of natural habitat.

3.7.2.2 Relationship of the Comprehensive Plan to Regional Conservation Planning

The goals and information supporting both the Comprehensive Plan and the SDCP were developed in concert so that they would be compatible and mutually supportive. The commitments within these plans to improve the quality of the built environment and the effectiveness of the conserved environment will likely improve the fiscal, natural, and cultural resources on a short-term and long-term basis within Pima County. The CLS and urban land systems that result from these processes are physically interdependent, with the CLS serving as a form-maker for current and future urban landscapes.

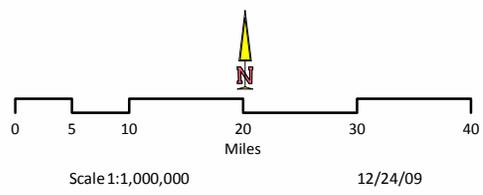
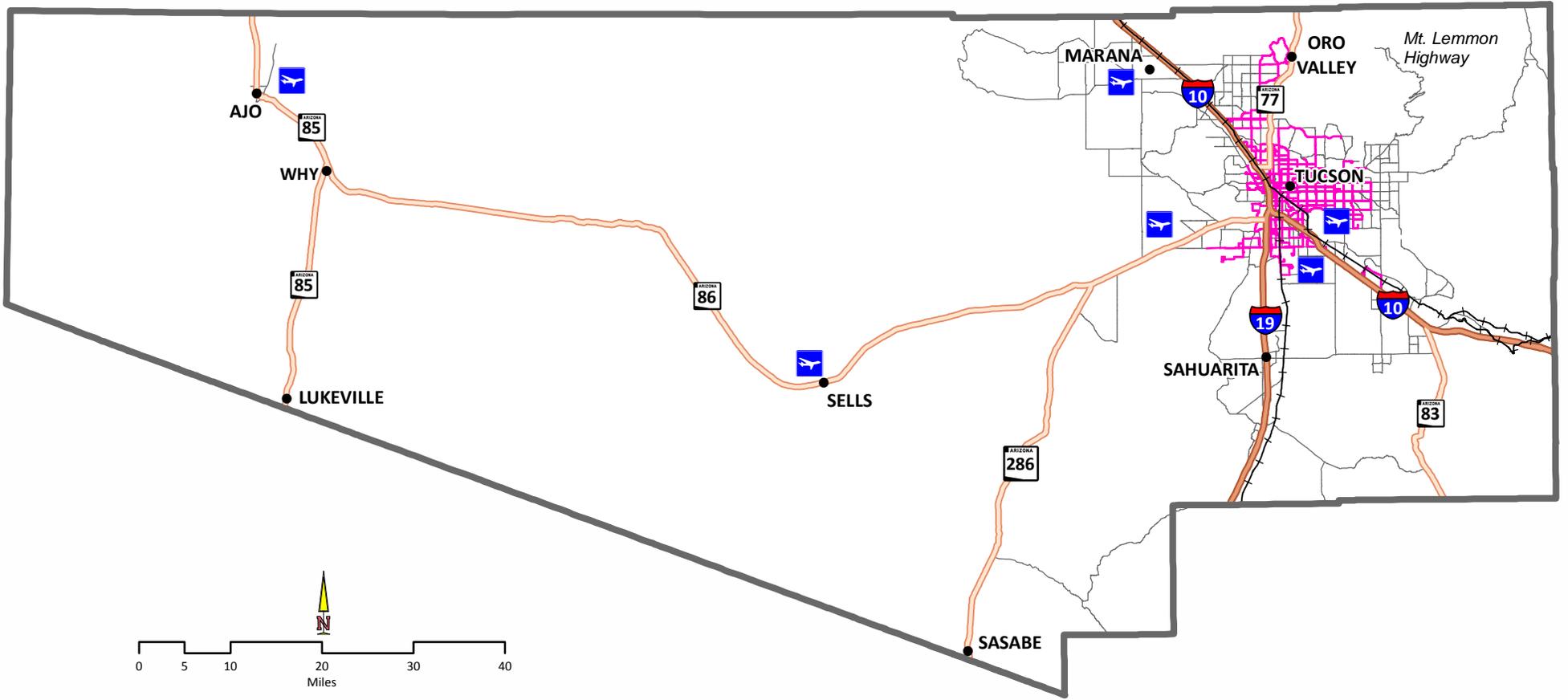
3.8 Transportation

This section discusses Pima County's transportation system in terms of the physical system and network components, planned future expansions, and regulatory context. Information presented is based on Regional Transportation Plan prepared by PAG, and transportation planning documents of the Arizona Department of Transportation (ADOT), Pima County, Town of Marana, and the City of Tucson.

3.8.1 Regional Overview and Historic Perspective

Archaic, Hohokam, and early Piman Sobaipuri and O'odham created the first human paths and routes in prehistoric times in what is now Pima County. European exploration and trading expeditions further developed many of these into trading routes that extended far south to Mexico, west to the Pacific and north to the Colorado Plateau. De Anza's journeys down the Santa Cruz River valley to the Gila River and west to California are commemorated by the Juan Bautista de Anza National Historic Trail, which follows the Santa Cruz River from Mexico, through Pima County (where Interstate 19 and Interstate 10 now run) and ends in San Francisco. Tucson was considered an important way-station along the Butterfield Overland Mail stagecoach line, which is now generally paralleled by Interstate 10.

The transportation system in Pima County now consists of airports (Tucson International Airport, Davis–Monthan Air Force Base, and several smaller airports), railways (passenger and freight service), a network of streets and highways (Federal interstate highways, State highways, County roads, and street networks of local jurisdictions), an urban transit system in the Tucson area, and an increasingly connected and developed system of trails and pathways. The major portions of these transportation system elements are located in eastern Pima County, in and connecting to the Tucson metropolitan area (Figure 3.12).



-  Regional Airport
-  Union Pacific Railroad
-  Arterial Street Network
-  Interstate Highway
-  State Highway
-  Bus Route

Figure 3.12
Major Transportation Elements

3.8.1.1 Airports

The Tucson International Airport is operated by the Tucson Airport Authority. It has approximately 60 flights daily and accommodates approximately 4.4 million passengers annually. Ryan Airfield, located west of Tucson, is a smaller general aviation airport that is also overseen by the Tucson Airport Authority. Facility expansions and acquisition of buffer areas are under way for both the Tucson International Airport and Ryan Airfield.

Davis–Monthan Air Force Base (DMAFB) has been in operation since 1925. Its pilot training and tactical air operations provide medical, search, and rescue services, and support Department of Defense forces worldwide. Nearly every major air command, the Air Force Reserve and the Army National Guard are represented. Other Federal agencies using DMAFB include the Federal Aviation Administration, the U.S. Customs and Border Protection Air Service Branch, the U.S. Army Corps of Engineers, the Federal Law Enforcement Training Center, and a detachment of the Naval Air Systems Command. A wide variety of aircraft are flown from the DMAFB, including A-10s, F-16s, Pavehawk helicopters, and many others. No longer surrounded by uninhabited land, DMAFB and the Tucson International Airport face growing concerns over noise, public safety, and urban encroachment.

Regular training flights and bombing exercises occur on Barry Goldwater Air Force Range, which extends into western Pima County. Here there are potential conflicts with desert bighorn sheep and federally endangered Sonoran pronghorn.

Other airports in Pima County include the Ajo Municipal Airport, Marana Regional Airport (previously known as Avra Valley Airport), La Cholla Airpark, Sells Airport, and other smaller airstrips.

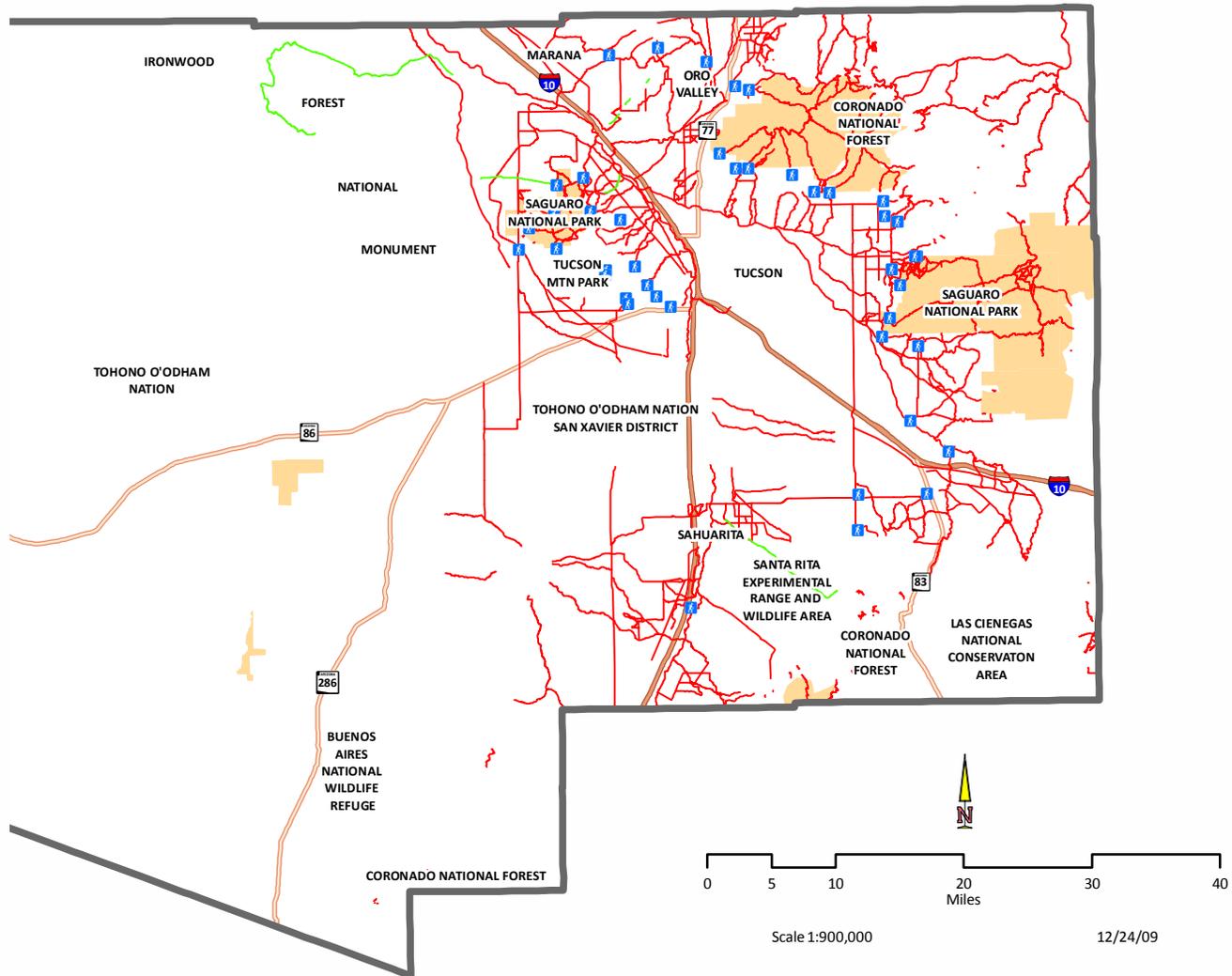
3.8.1.2 Railroad

The major portion of the railway was completed in 1867, when the Southern Pacific Railroad became an important link in America's transcontinental railroad. This was instrumental in the development of Tucson, which then became the Arizona territory capital. The railroad system currently provides both Amtrak passenger rail service and Union Pacific freight service. The railway runs parallel to Interstate 19 and the Santa Cruz River and follows along Interstate 10, connecting to Nogales, Los Angeles, and New Orleans.

3.8.1.3 Roadway System

3.8.1.3.1 Federal Highways

Federal interstate highways include interstate highways 10 and 19. Interstate 10 extends east to Cochise County and northwest to Pinal County (Figure 3.13). Interstate 19 extends from Interstate 10 in Tucson south to Green Valley and further, to the Nogales



- Trailhead
- Trail
- Scenic Route
- Wilderness Area

Figure 3.13
Trails, Trailheads, and Scenic Routes
in Eastern Pima County

International Port of Entry. Approximately 60 miles of Interstate 10 and 32 miles of Interstate 19 are within Pima County.

3.8.1.3.2 State Highways

The primary state highways in Pima County are:

- State Route 86, which connects Tucson to Ajo
- State Route 85, which extends from State Route 86 at Why south through Organ Pipe Cactus National Monument to the International Port of Entry at Lukeville and north to Gila Bend
- State Route 286, which extends from Three Points south through Altar Valley to the International Port of Entry at Sasabe
- State Route 77 (Oracle Road and Highway), which extends from Tucson north to the towns of Catalina and Oracle
- State Route 83, the Patagonia–Sonoita Highway, which extends from Interstate 10 south to Sonoita in southeastern Pima County
- Mt. Lemmon Highway, also known as Catalina Highway and Sky Island Parkway, which provides access from the base of the Catalina Mountains to the Town of Summerhaven. Pima County has maintenance responsibilities for Catalina Highway, but any actions on Federal lands are not part of the MSCP.

Other State routes and roads include Tangerine Road, the Old Nogales Highway, portions of Grant Road, and 6th Avenue.

3.8.1.3.3 Transportation Plans for County and Local Streets and Roads

The area covered by the urban footprint of Tucson is around 200 square miles. Most of this is laid out on a classic section-line/one-mile grid pattern. Projects of the \$2.1 billion dollar, 20-year Regional Transportation Authority plan include road, transit, safety, and environmental and economic vitality projects. The Regional Transportation Authority plan is now in its seventh year, with 91 projects under development and 502 projects and services completed. Through July 31, 2012, the Regional Transportation Authority has collected \$403.9 million in excise taxes.

3.8.2 Future Plans and Regulatory Context

The number of travel miles driven by 2030 is projected to represent an increase of 52 percent over 2000 levels and the vehicle-hours traveled are anticipated to increase by

99 percent (PAG 2006). Total average daily travel by all residents of Pima County for the year 2030 is estimated to be 47,690,000 miles. Trips by personally owned vehicles are expected to increase by 75 percent, while trips by mass transit are expected to increase by 66 percent. Trips under heavily congested roadway conditions are expected to increase from 27 percent in 2005 to 38 percent in 2030. Travel under severely congested conditions is expected to more than double, increasing from about 13 percent in 2005 to 33 percent in 2030.

Some of the transportation planning efforts and projects that are being undertaken to address the increasing travel demands are briefly described below.

3.8.2.1 Federal and State

The Federal Aviation Administration and the Federal Highway Administration have purview over aviation facilities and the interstate highway system. Their activities and planning efforts in Arizona are coordinated and directed under the authority of ADOT.

A number of improvements to both Interstate 10 and Interstate 19 have been completed in the last 5 years. ADOT completed widening along Interstate 10 between Prince and Congress and has recently completed work to widen Interstate 10 between Ruthrauff Road and Prince Road. Other plans call for the eventual widening of Interstate 19 from 6 to 8 lanes between Interstate 10 and Green Valley. ADOT is preparing corridor studies for these interstate segments to assess existing roadway infrastructure and traffic conditions and to help determine future needs, potential impacts, and mitigation.

There are two transportation planning efforts under way that may potentially define a transportation corridor through Avra Valley. The Regionally Significant Corridor Study is targeted for completion shortly and will be routed through the Pima Association of Governments committee process for ultimate action by the PAG Regional Council. The Interstate 11 and Intermountain West Corridor Study is being undertaken by ADOT. This study is currently focused on transportation corridors between the Phoenix metropolitan area and Las Vegas, Nevada. Subsequent phases of this study will explore the feasibility of extensions into southern Arizona through Pima County. The ADOT Interstate 11 study will ultimately be presented for consideration by the State Transportation Board for adoption as a long-term plan for addressing transportation needs in the State of Arizona.

The new proposed Interstate 11 route would avoid populated areas while steering clear of Ironwood National Forest, Saguaro National Park, and other environmentally sensitive lands. The proposed route would require nearly 5,000 acres of Pima County CLS mitigation. Funding sources have yet to be identified, but would require Federal, State and local resources, with the primary funding coming from Federal and State sources.

3.8.2.2 Regional and Local

Established in 1973, PAG is an association of local, State, and Tribal governments that coordinates transportation, environmental quality, and population growth planning efforts. As the Metropolitan Planning Organization for Pima County, one of PAG's responsibilities is to coordinate the development of the Regional Transportation Plan, which secures Federal transportation funding for the region (PAG 2006). PAG is governed by a regional council, which includes representatives from the following:

- Pima County
- City of Tucson
- Tohono O'odham Nation
- Pascua Yaqui Tribe
- City of South Tucson
- Town of Marana
- Town of Oro Valley
- Town of Sahuarita
- State Transportation Board

PAG's Transportation Planning Division is responsible for the development of many transportation plans and programs, including the long-range (25-year) Regional Transportation Plan and the short-range (5-year) Transportation Improvement Program. PAG coordinates with the Regional Transportation Authority Board, established in 2004. The primary goal of the Regional Transportation Authority is to build consensus among regional jurisdictions in order to prepare a regional transportation plan.

PAG oversees or monitors various studies of regionally significant transportation corridors, both existing and planned, and the Regional Transportation Authority plan is built upon these studies that are designed to provide more detailed information about a specific area or transportation corridor. These studies assess existing conditions, as well as the needs and feasibility for proposed new or expanded transportation facilities through 2030 and beyond. These studies may be performed by PAG, ADOT, or one of the local governmental agencies in the region. Studies that are currently completed include the following:

- Southeast Arterial Loop Study
- State Route 77 Multimodal Corridor Profile Study
- 2040 Regional Transportation Plan
- Interstate 10 East Corridor Study
- Interstate 19 Corridor Study
- Oracle Road/State Route 77 Corridor Study

- CanaMex Corridor
- University of Arizona Needs Assessment Study
- Street Car Land Use Study
- Coordinated Transportation Plan
- Pima County Americans with Disabilities Act Transition Plan Update
- State Transportation System Mobility and Regional Circulation Needs Feasibility Study (Loop Road Study)

The Regional Transportation Authority plan includes \$45 million for transportation-related critical wildlife linkages as part of the environmental and economic vitality element of the plan. The Regional Transportation Authority has established the Wildlife Linkages Working Group to develop priorities to evaluate eligible projects, to make recommendations on project funding to the Regional Transportation Authority Board, and to provide reports to the public on the implementation of the program.

3.8.2.3 Eastern Pima County Trail Master Plan

The trail plan for eastern Pima County includes a network of trails and bike paths, the framework of which relies heavily on the linear riverpark trails system along the Rillito and Santa Cruz rivers. It includes 15 Pima County trailheads that provide access to the Coronado National Forest, Saguaro National Park, Tucson Mountain Park, and the Cienega Creek Natural Preserve (see Figure 3.13). The long-term goal is to provide an interconnected system of paths and trails that connect with all major public lands and ties the Pima County trail system to larger statewide and national trail systems. Extensions and improvements to the trails system are on-going, including the completion of the Arizona Trail.

3.8.2.4 Juan Bautista de Anza National Historic Trail

The Juan Bautista de Anza National Historic Trail follows the west bank of the Santa Cruz River in Pima County, from the Santa Cruz County line to the Pinal County line. Pima County has an approved Master Plan for the trail that includes the preferred trail location, standard cross-section, and the locations for trailheads and sites that commemorate the campsites used by de Anza during his 1775 colonizing expedition. The Master Plan lays out the vision for this trail, some of which is already in place on the ground. Other segments will be added as funds permit, with the eventual goal of a continuous trail through Pima County, and beyond.

3.9 Ranching and Agriculture

This section discusses historic conditions and current trends in ranching and agriculture, their role in the local economy and their role in the SDCP. Information here is from the SDCP planning process, including reports by Pima County (2000c).

3.9.1 Ranching

3.9.1.1 Historic Overview and Current Trends

Livestock ranching has deep historical roots in Pima County dating to the first Spanish explorers and missionaries who brought domestic cattle, horses, sheep, and goats to the missions in the 16th and 17th centuries. Currently, ranch lands in Pima County are comprised of a mosaic of land ownership, including private, Tribal, Federal, and State Trust lands. This patchwork of ownership is a consequence of the history of land ownership designations dating back to the first Spanish Colonial land grants, and continuing with the 1854 Gadsden Purchase, various homesteading laws in effect between 1862 and 1934, the establishment of national forests, and the Arizona State Enabling Act. The resultant mix of ownership typically accommodates a corresponding mix of land uses, such as natural area preserves, recreation, ranching, hunting, mining, and timber harvesting.

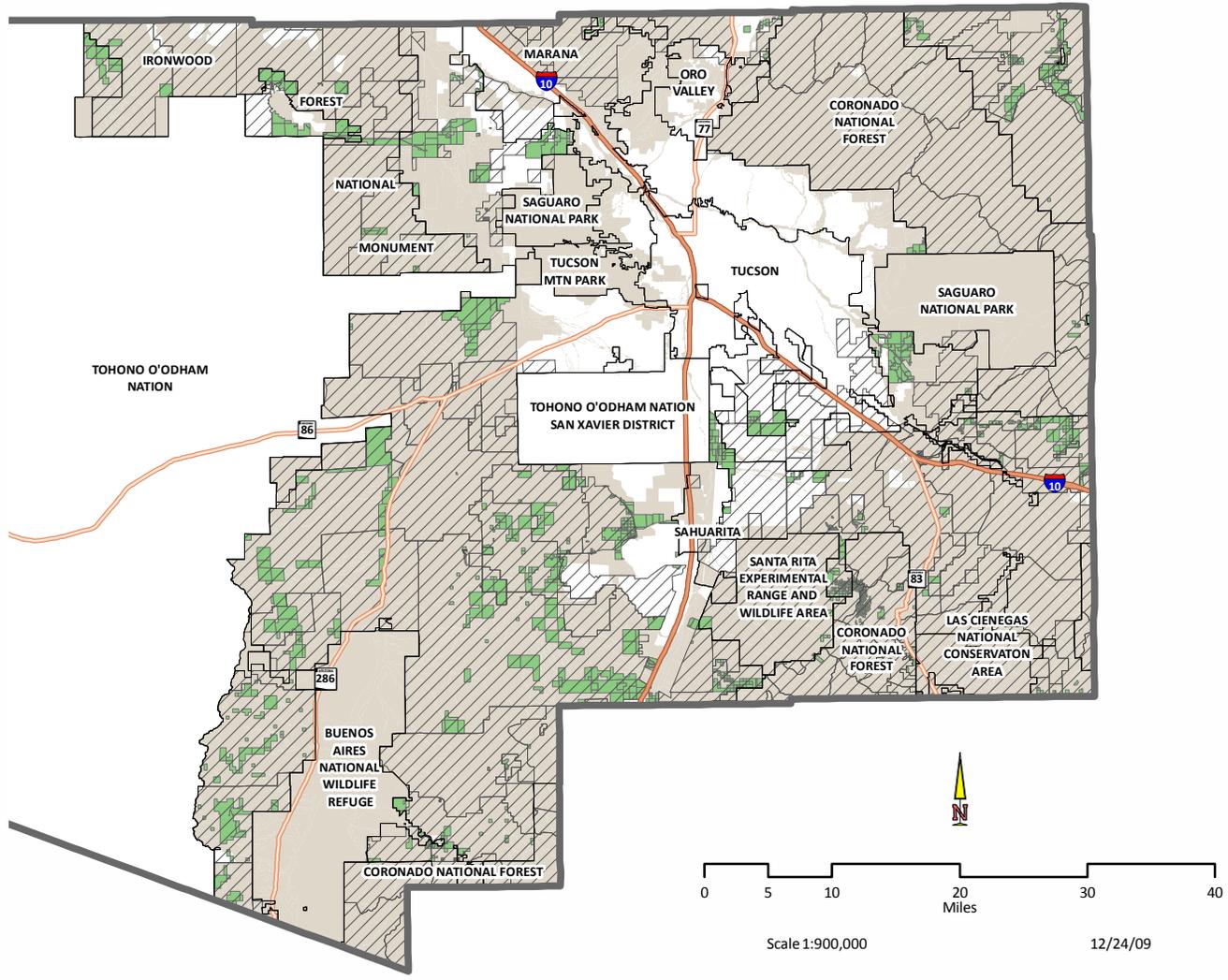
Most ranches in Pima County are family-owned operations that include a relatively small amount of deeded private lands—often the original family homestead claims—and public lands leased for grazing (Table 3.5 and Figure 3.14). Over half of the total acres are owned by the State Land Department and approximately one quarter is on USFS and BLM lands.

**TABLE 3.5
PIMA COUNTY RANCHING LAND BASE**

Ownership	Acres in Ranching/ Agricultural Use (2013)	Percent of Total Ranch Lands
Arizona (State Land Department Trust Lands)	801,212	49%
USFS	258,686	16%
BLM	361,831	22%
Pima County	44,567	3%
Private Ranch Lands	159,225	10%
Total	1,625,521	100%

According to the U.S. Department of Agriculture's agricultural census, the number of cattle in Pima County has steadily declined by over 50 percent between 1992 and 2012 (51,000 head in 1992; 26,000 head in 1997; 26,000 head in 2002; 19,701 head in 2007; 18,312 head in 2012). This decline can be attributed to drought, as well as conversion of ranch lands to real estate development.

Approximately 1.5 million non-Tribal acres in eastern Pima County are used for ranching, potentially supporting approximately 19,000 cattle, though the number may now be much lower due to recent severe drought conditions. In eastern Pima County, if lands are not grazed, it is usually due to some legal or jurisdictional barrier, such as a



- Private Ranch Land
- Conservation Lands System
- Grazing Allotment
- Administrative Boundary

Note: Some vacant private lands (not pictured) are also grazed.

Figure 3.14
Private Ranch Lands and Grazing Allotments

national park designation, or urban development, and encroachment of suburban areas. Ranch lands comprise nearly 70 percent of the Pima County CLS.

Pima County does not have jurisdiction over ranching and grazing operations on lands outside of those purchased and leased by the County, unless a property owner wishes to engage in land development as regulated by the County Code or to sell land for development rights. Ranch conservation is dependent upon the availability of ranch lands for sale, the number of ranchers that voluntarily seek to sell their development rights and record a conservation easement, and the distribution of those parcels.

3.9.1.2 Grazing History in Southern Arizona

As mentioned above, the history of ranching and livestock grazing in southern Arizona began in the late 1600s, when Father Eusebio Francisco Kino brought a herd of cattle into the area. However, herd sizes were relatively small until after the 1870s, when the Gadsden Purchase placed the area south of the Gila River in American possession. Cattle herd sizes grew significantly between the 1870s and 1890s, but a drought in the early 1890s resulted in a sharp decline in herd numbers. Although livestock herds have been reduced, grazing has continued in southern Arizona. Livestock ranging over the terrain has been shown to have contributed to environmental change in the area (Clemensen 1987).

Grazing policy has also changed in southern Arizona since livestock were introduced. Gradually, starting in the early 1890s, a systematic grazing policy was developed by the Department of the Interior and Department of Agriculture (U.S. Forest Service), developing a grazing permit system. The grazing permit system reduced livestock numbers, but grazing continued to contribute to environmental changes in southern Arizona. However, grazing was not the only cause of environmental change in the area. The severe droughts in the 1880s and 1890s, along with an increasing population also resulted in environmental change. The growing population and increasing military presence used mesquite and large shrubs as fuel, significantly reducing large trees and shrubs throughout the region, particularly in the vicinity of Tucson. The combination of livestock grazing, drought, and an increasing population has resulted in the current environmental condition in southern Arizona (Clemensen 1987).

3.9.1.3 Role of Ranching as Land Use in Pima County

While the human population in the Tucson area grows and sprawls, the natural open space and ranch lands that support ranchers are diminishing as rural properties and private ranch lands are sold. More recently, a number of large land holders have sold their lands to Pima County as part of the SDCP and mitigation effort for the MSCP.

Ranching as a land use benefits Pima County and supports the goals of the SDCP in many ways:

- Ranching is uniquely capable of protecting Pima County's natural open space and wildlife habitat. It results in large areas of unfragmented open space and habitat critical for maintaining sustainable and diverse ecosystems and wildlife corridors. These open spaces provide connectivity across valleys, and provide a variety of natural communities, from riparian bottomlands to bajadas, foothills, and mountain environments. These areas remain largely intact.
- Unlike most other land uses, and due to a large part to its extensiveness, ranching brings together private, State, and Federal lands into unified, large management units making grazing management, open-space protection, and wildlife management easier.
- Ranching has been and continues to be the single greatest determinant of the Tucson urban boundary that defines the metropolitan and rural interface, thereby maintaining a more compact urban form.
- The depth and breadth of knowledge of the natural landscape and the culture embodied in the ranching community contribute significantly to ranchers' ongoing stewardship of the land and enrichment to the community.
- Ranch lands preserve many of the fragile, non-renewable archaeological and historical sites and much of the cultural landscape with its visual, social, cultural, and historical character.
- Ranching and agriculture provide rural industry and help to diversify the local economy.

Ranch conservation is one important mechanism to help define the urban boundary, preserve natural open space and habitat values, and allow the sustainable use of the land for grazing to continue. Because the greatest majority of ranch lands are State Trust grazing leases, the 109 allotments or grazing lease areas essentially show where operating ranches have remained viable. In addition to the existing land reserves such as Saguaro National Park, Coronado National Forest, and Tucson Mountain Park, operating ranches and their public land grazing leases currently define the urban/suburban boundary.

For Arizona State Trust Land grazing leases, the Arizona Legislature does not provide any funding for the Land Department to institute any agency-initiated management practices for rangeland. The Land Department relies on the grazing lessees to expend their own funds to initiate management practices on their rangeland leases. Management practices include water sources (such as wells and stock tanks), water distribution systems (pipelines), handling facilities (corrals), livestock control measures (fencing), and various types of land treatments to remove undesirable species (prescribed fire, grubbing, agra-axe, root plowing, chaining, and herbicides), or desired

plant vegetation (reseeding). There are currently six Land Department range managers in the State that manage over 9 million acres of rangeland (Arizona State Land Department 2013).

3.9.1.4 Pima County-managed Ranch Land

As a part of the SDCP land conservation strategy, Pima County has purchased nine ranch properties. The Natural Resources Parks and Recreation Department (NRPR) is responsible for managing these open space properties. For all ranches purchased, there are independent operators, generally the previous owners, who own the cattle, manage the ranches day-to-day, and are responsible for operational costs under terms of a Management Agreement. Ranch operators have entered into third-party agreements with the County to conduct operations on County property and on grazing leases held by the County under the conditions outlined in the Management Agreement. This strategy relieves the County of operational and maintenance expenses on the ranches while directing operation of the ranching operation in a sustainable ecological manner. The exception to this third-party management model is the A7 Ranch, which is operated by Pima County NRPR staff.

The NRPR Department manages the ranch land properties with the intent to achieve sustainable use of natural resources and maintain functionally healthy habitat for both wildlife and livestock. The County uses science-based techniques developed by the U.S. Department of Agriculture (USDA) Agricultural Research Service (ARS), USDA Natural Resources Conservation Service (NRCS), and BLM to inventory rangeland resources, assess rangeland health and riparian function, and monitor rangeland conditions and trends. These techniques guide ranch management and grazing management decisions. A summary of grazing leases and ranch properties managed by Pima County is shown in Table 3.6.

There are currently ranch management plans for Sands and Bar V ranches, and for a portion of Rancho Seco. A fourth plan, for A7, is currently under way. All three of the existing plans were developed with staffing and assistance from the USDA NRCS, using the Coordinated Resource Management Plan (CRMP) framework. The plans were developed with input from the State, NRCS, Pima County, and the rancher. The CRMPs identify the need for ranch improvements (including construction of new stock tanks, cattle guards, and fencing) and set expectations or goals about how grazing, wildlife improvements, and public access will be managed. CRMPs can be reviewed by the public and would provide a venue for public comments after the adoption of the MSCP. The MSCP would require that management plans be prepared for all Pima County-managed ranches. Ranch utilization rates are established by the MSCP Ranch Management Standards and Guidelines (see MSCP Appendix F). Pima County-managed properties in the Altar Valley also have fire management plans.

**TABLE 3.6
PIMA COUNTY-MANAGED RANCH LANDS**

Ranch Name	Total Acres	County Acres	ASLD Acres	BLM Acres	AUMs FY 13/14	Notes
A7	41,104	6,829	34,195	30	2,820	County owns livestock
Bar V	27,111	1,763	12,674	0	948	County holds lease
Buckelew	3,205	1,005	2,000	200	0	County holds lease
Carpenter	930	930	0	0	n/a	
Clyne	880	880	0	0	n/a	
Diamond Bell	30,893	191	29,904	798	2,880	County holds lease
Empirita	3,060	3,060	0	0	n/a	County does not hold lease
Kings	4,540	1,034	3,506	0	200	County holds lease
Old Haybrook	5,995	839	0	5,156	n/a	Wilderness combined with Kings 98; County holds lease
Marley	114,400	6,337	85,900	2,800	n/a	County does not hold lease
Rancho Seco	36,895	9,574	21,662	5,699	2,916	County holds lease
Sands	5,040	5,040	0	0	n/a	
Six Bar	12,292	3,292	9,000	0	876	County holds lease
Sopori	15,219	4,132	11,074	0	1,155	County holds lease
M Diamond	8,422	624	7,798	0	0	County hold lease
Total	309,986	45,530	217,723	14,683		

Source: ASLD 2013

ASLD = Arizona State Land Department

AUM = Animal Unit Month

All Pima County-managed ranches require a management plan; however, not all management plans will follow the CRMP framework. The Haybrook Ranch, which is not part of mitigation lands for the MSCP, has a management plan that is focused on priority vulnerable species, and not grazing. This is a County-managed ranch that was acquired using partial Federal funding to contribute to the goals of the SDCP, but which results in this ranch being ineligible for mitigation credit under the MSCP.

3.9.1.5 Threats to Ranching Land Base

Despite its benefits, the economic sustainability of ranching is threatened by the growing disparity in land values for agricultural versus suburban/commercial purposes. As landscapes become more urban, increasing difficulties with ranching combine with growing expectations of lucrative land sales.

Because land tends to be cheaper at the urban edge, developers have sought to buy former ranch lands at the outer limits of the built metropolitan area and have created new subdivisions and even new communities. Rather than attempt reinvestment and redevelopment of the urban core, the development industry has taken the lower risk, lower cost strategy of suburban and exurban investment, uniform product development, and long-term land speculation. Consequently, the Tucson metropolitan area has

experienced rapid expansion of its suburban areas pushing its urban limits outward (Figure 3.15).

In addition to regulated development, lot-splitting or wildcat development is becoming more prevalent in the areas outside the metropolitan area. This kind of development fragments the natural landscape, further contributes to sprawl, often devalues property, and can create significant hardships for its residents. This kind of development is generally defined as the proliferation of new residential parcels without the benefit of subdivision regulation, which ensures that certain standards for public health and safety are met. In 1997, 41 percent of new residential dwelling units receiving permits in unincorporated Pima County were not part of platted subdivisions (Behan 1998).

While ranches and their grazing leases have been effective in determining the urban edge, private ranch lands subject to conversion and State grazing leases can also be terminated for sale for development, especially at the urban edge where development pressure is greatest.

3.9.2 Agriculture

3.9.2.1 Overview and Historic Perspective

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

Agriculture as a production industry developed during the late nineteenth century and into the mid-twentieth century with homesteading and settlement of southern Arizona. Production increased steadily during the first half of the twentieth century in response to increasing demand for cotton and from improvements to water-delivery technology. High-volume deep-draft pumps during the 1950s contributed to a period of significant growth when irrigated agriculture reached its peak in acreage planted. Cotton production reached its all-time high in 1958.

The total acreage estimated to have been in production during much of the twentieth century is between 60,000 and 88,000 acres, most of it focused along the Santa Cruz River near Green Valley, at San Xavier del Bac, near the confluence of the Rillito and Santa Cruz rivers, and in the Post Farms area near Marana. With the ability to pump ground water for irrigation, large areas of the lower Avra Valley along Brawley Wash were also brought into cultivation.

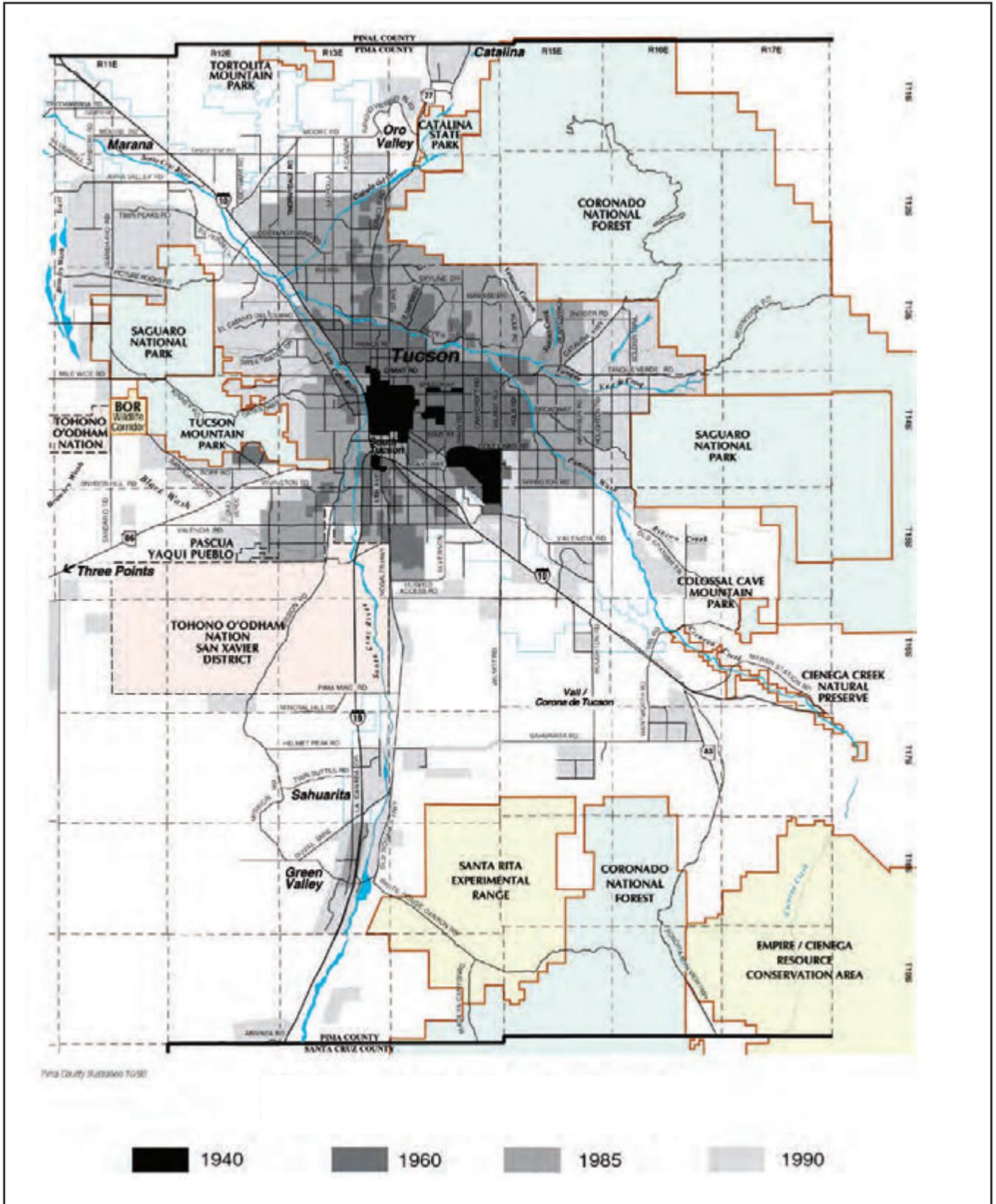


FIGURE 3.15
Urban Expansion in the
Metropolitan Tucson Area

After sustained growth during the first half of the century and through the 1950s, agricultural production slipped into decline. Reasons for the decline include increased costs of pumping, increased land values, insect problems, and drought. Competition for finite sources of groundwater in the arid southwest was also an issue. Growing concern over groundwater overdraft led to legislation limiting groundwater use. The Colorado River Basin Act was signed in 1968 to authorize construction of the CAP and by 1993 Pima County began receiving delivery of CAP water.

Eastern Pima County now has about 22,000 acres or less of agricultural lands remaining in production. In the 1970s, the City of Tucson began an active program of buying agricultural lands and retiring their water rights to ensure an adequate future water supply for the metropolitan area. Many of these City of Tucson farms were purchased in the lower Avra Valley, and a few large parcels occur in the northern Altar Valley. Assessor records indicate that the city owns as many as 47,000 acres of former croplands, most of which are no longer irrigated. Some of the other agricultural lands taken out of production have been converted to development such as in the Town of Marana and Green Valley area. Most of the remaining croplands are classified as “prime agricultural land” by the U.S. Department of Agriculture. The majority of these remaining cultivated farmlands occur near the confluence of the Santa Cruz River and Brawley Wash in the Tortolita Fan (13,821 acres) and in the Avra Valley (3,579 acres), where cotton, grains, and other food crops are grown. The Upper Santa Cruz Valley has 7,359 acres in production, most of it in pecan orchards.

Today, two main farming areas make up the majority of irrigated agriculture in Pima County: Marana–Cortaro and Avra Valley, northwest of Tucson; and Green Valley and Sahuarita, south of Tucson. The Cortaro Marana Irrigation District and the Avra Valley Irrigation District provide irrigation to the farming district in the north; the southern areas are operated by the Farmers Investment Company.

Cotton remains the predominant crop grown in Pima County and is usually rotated with winter wheat or barley. Other crops include alfalfa, sorghum, and vegetables. The Farmers Investment Company to the south of Tucson is dedicated primarily to pecan orchards with a few hundred acres devoted to row crops when market prices are favorable (Orr and Wilson 1999).

3.9.2.2 Effect of Shifts in Water-use Priorities

In addition to the construction of the CAP, a State bill allowing cities to purchase and retire farmland for the water rights was passed in 1977. In the 1980s, pressure to reduce farmland acreage resulted in the national payment-in-kind policy and the local Arizona Groundwater Management Act of 1980. This act, administered by the ADWR, anticipated the unprofitability of agriculture in favor of higher value municipal and industrial use, and specifically promoted a program of agricultural water conservation and control of acreage under cultivation. The ADWR issued groundwater withdrawal

certificates, Irrigation Grandfathered Rights, based on historical use, and stated that no new land could be brought into production (with certain limited exceptions). In Pima County, those certificates equate to just over 200 Irrigation Grandfathered Rights of at least 10 acres in size, pertaining to approximately 35,000 acres with a maximum annual groundwater allotment of 153,000 acre-feet.

In the last 30 years, the demand for water rights for municipal water supply, coupled with increasing demand for developable land, has driven the trend in retiring agricultural land in Pima County, particularly in Avra Valley and the Town of Marana. Cultivated land has been converted into residential and commercial land uses as population growth results in the value of the land exceeding the agricultural income generated.

At the same time, agriculture expanded on Tribal lands in Avra Valley and in the San Xavier District due to the Southern Arizona Water Rights Settlement Act, which provides CAP water to the Tribes. In addition, there are a growing number of small-scale farmers in the built environment and on previously irrigated lands peripheral to the built environment.

3.9.3 Economic Role of Ranching and Agriculture

Despite price uncertainties on both the input and output sides, yield variability, and operating expenses that approach more than 70 percent of gross sales, ranchers and farmers in Pima County contributed nearly \$68 million to the state and local economy in 2007, up from \$38 million 1992. Most ranches and farms are small- to moderate-sized operations, and many produce only supplementary income for their owners, with an average net cash return of approximately \$13,500 in 2007. In 2007, the net after-taxes return to the 622 Pima County farms and ranches was nearly \$8.5 million (U.S. Department of Agriculture 2009).

The economic benefits of tourism (both eco-tourism and agricultural tourism) in rural areas are considerable. In 2008, total tourist and visitor expenditures statewide were almost \$18.5 billion dollars with \$2.1 billion spent in Pima County (Arizona Office of Tourism 2008). While this accounted for the full range of visitors, about \$1.34 billion was spent on hunting, fishing, and wildlife associated recreation (Arizona Office of Tourism 2008). Agricultural tourism is another growing tourist industry where pick-your-own orchards, pumpkin fields, and vegetable fields can attract as many as 10,000 to 30,000 visitors per farm during the produce season. Moreover, some ranches are beginning to offer ranch-living and “round-up” tour packages, attracting many tourists seeking an experience of working and living on a real western ranch.

3.9.4 Ranch Conservation and the SDCP

As one of the six elements of the SDCP adopted by the Pima County BOS, the value of ranch conservation has been acknowledged as an important conservation element in its

own right. Moreover, by including ranch lands as a productive working landscape worthy of conservation, Pima County formalized its commitment to ranching as an important land use and to keep ranchers ranching. Pima County understands that working ranches and the State and public lands leased for ranching are critical to achieving multiple community and conservation goals. Pima County convened a Ranch Conservation Technical Advisory Team to provide assistance in developing the Ranch Conservation Element of the SDCP. The Ranch Team sponsored meetings and workshops, and provided technical advice to County staff and the SDCP Steering Committee that created the basis for the acquisitions of ranches under the SDCP.

3.10 Cultural and Historic Resources

This section presents summary information on how Pima County defines its cultural and historic resources, the results of its efforts to identify and evaluate these resources, and the regulatory framework and policy recommendations that have been made for cultural and historic resources protection. Sources of information include numerous cultural resource related reports prepared for the SDCP, and other reports listed in Chapter 8.

3.10.1 Introduction and Background

Pima County is rich in history, culture, regional character, and diversity, all of which contribute greatly to its collective cultural heritage and community identity. Cultural and historical resources are those places created by and have cultural meaning for the people who have lived and now live in what is today Pima County. These places include archaeological sites of both prehistoric and historic times; buildings, structures and engineered features, historically defined landscapes; and places of traditional cultural importance to the beliefs, practices, and historical identity of traditional communities. Together these places represent approximately 12,000 years of human settlement.

The term cultural resource is used here to broadly refer to archaeological sites and districts, historic sites and districts, and traditional cultural places. Pima County has defined each of these, as follows, for all of its studies on cultural resources. Most of what is known about cultural resources in eastern Pima County is largely focused on archaeological and historic sites and districts that are recorded with the Arizona State Museum and those listed in the National Register of Historic Places (NRHP) and the State Register of Historic Places (SRHP).

3.10.1.1 Archaeological Sites

Archaeological sites are the material remains of past human life or activities that are preserved in their original setting, and which are important to understanding prehistory or history. These sites or districts may include occupation sites, work areas, farming sites, burials and other funerary remains, artifacts, campsites, hearths, rock art, intaglios, trails, battle sites, religious or ceremonial sites, caves and rock shelters, the architectural

or other remains of structures of all kinds, such as pit houses, pueblo rooms, adobe or rock foundations, and other domestic features, usually dating from prehistoric or aboriginal periods, or from historic periods at least 50 years old, for which only archaeological vestiges remain. This definition has been broadly applied to include prehistoric and historic sites of all time periods, functions and spatial distributions from the earliest human occupation some 12,000 years ago into the twentieth century. Some NRHP- and SRHP-listed archaeological sites and districts in Pima County include Tumamoc Hill, the Valencia Site, and Los Robles Archaeological District, among others.

3.10.1.2 Historic Sites

Historic sites are sites, districts, structures, objects, or other evidences of human activities that represent facets of the history of the nation, State, or locality. In addition, historic sites may include places where significant historical or unusual events occurred even though no evidence of the event remains, or places associated with persons significant in our history that have gained importance in the last 50 years. Historic sites include a wide variety of sites, buildings, structures, and objects, such as residences, commercial establishments, schools, churches, military forts, cemeteries, parks, streetscapes, and landscapes. A number of historic sites and districts in Pima County are NRHP- and SRHP-listed either individually or as groups of properties defined as districts, such as Barrio Viejo, Armory Park, El Presidio, and the Binghamton Rural Historic Landscape, among others.

3.10.1.3 Traditional Cultural Places

A traditional cultural place is associated with cultural practices or beliefs of a living community that are rooted in that community's history and important in maintaining the continuing cultural identity of the community. The cultural significance of a traditional cultural place is derived from the role that the place plays in a community's historically rooted beliefs, customs, and practices. Cultural resources that meet this definition are typically identified as being significant to Native American communities, but the definition is applicable to all communities. Traditional cultural places can include a place where traditional plants used in ceremony are gathered, a landscape feature associated with an event or figure that is important in creation myths, a spring revered because of its life-giving water, an ancestral settlement site still occupied or used by a traditional community, or a place where certain ceremonies and sacred practices are conducted, such as El Tiradito in Tucson's Barrio Viejo, among others.

Examples of each of these kinds of cultural resources are known in eastern Pima County. Much more is known about archaeological and historical sites than traditional cultural places, which is a result of different research histories, with much more research and recordation occurring after passage of the National Historic Preservation Act (NHPA) in 1966. Archaeological sites in southern Arizona have been recorded for over 100 years. Architecturally important buildings and historic sites have been the subject of

documentation for preservation purposes since the 1930s beginning with efforts by the Historic American Buildings Survey. Traditional cultural places have only been systematically considered in preservation planning since 1992, following amendments to the NHPA. Moreover, research into these kinds of cultural resources typically requires working with traditional communities through informants who may be reluctant to discuss some of these places because of their sensitive nature. Despite these issues there are a growing number of identified traditional cultural places in Pima County, including many archaeological sites considered to be ancestral sites of importance to the Tohono O'odham and other Native American Tribes. Sites of importance to other traditional groups are known as well.

3.10.2 Research on Cultural Resources for SDCP

Over the past 10 years, Pima County has engaged in an intensive effort to collect and analyze data on its cultural resource assets for the purpose of developing recommendations for their protection and conservation. This effort has taken a phased approach: collection of baseline data on all known cultural resources; identification of cultural resources of extraordinary importance (i.e., priority cultural resources); predictive modeling of cultural resource sensitivity areas, and the comparison of cultural resource data against information on high value natural resources. Out of this process emerged recommendations on the development and implementation of strategies for conserving cultural resources in Pima County.

3.10.2.1 Pima County's Cultural and Historic Technical Advisory Team

In 1999, Pima County created the Cultural and Historic Technical Advisory Team to assist County staff in the development of the cultural resources element of the SDCP. The team was composed of experts in the fields of archaeology, history, architecture, and historic preservation and represented the Arizona State Museum, University of Arizona, National Park Service, USFS, Tucson Chapter of the Arizona Historical Society, City of Tucson, and the Tohono O'odham Nation. Ad hoc expert teams were also created to help with predictive modeling of archaeologically sensitive areas and site locations, as well as to identify, evaluate, and recommend priority historic and archaeological sites for conservation. Twenty-six experts served on the teams and 10 others were consulted.

To facilitate this work, Pima County developed its own cultural resources database for its GIS through an arrangement with the Arizona State Museum that has allowed the County to periodically copy the museum's electronic files on archaeological and historic sites and surveys in order to maintain a current in-house database. Over the course of developing the Cultural Resources element of the SDCP, multiple background summary and policy reports on the history and prehistory of Pima County were prepared, as well as numerous technical reports on cultural resources studies conducted as a result of

County undertakings. Meetings continue to be held with various community groups and the Tohono O’odham Nation.

3.10.2.2 General Summary of SDCP Research Findings on Cultural Resources

Through the cultural research process, Pima County has gained a comprehensive understanding of cultural resources within its jurisdiction. The findings are briefly summarized as follows:

- Pima County has been continuously occupied for approximately 12,000 years from the end of the last Ice Age to the present day. Evidence of Archaic Period occupation is especially abundant in the Cienega Creek area and along the Middle Santa Cruz River where recent archaeological investigations have revealed the earliest known irrigation agriculture in North America dating to about 1250 BC.
- More than 4,000 archaeological sites are recorded in the County, yet only about 15 percent of the land base has been formally inventoried. Most common are sites dating to the period from AD 750–1450, during which time indigenous farmers known as the Hohokam occupied central and southern Arizona.
- More than 4,000 historic buildings have been recorded, most of which are within Tucson city limits. In general, these represent settlement during the nineteenth and early twentieth centuries, when Tucson emerged from a fortified Spanish Colonial and Mexican village to a major American metropolitan center.
- There are currently 150 historic sites and districts listed on the NRHP, and there are four National Historic Landmarks in Pima County including Mission San Xavier del Bac, the Carnegie Desert Laboratory, the Titan II Missile Silo No.8, and Ventana Cave.
- There are a number of historic communities, each of which are 50 years old or older, such as Ajo, Silverbell, Marana, Rillito, Catalina, Redington, Vail, Continental, Sahuarita, Arivaca, Sasabe, and Tucson.
- Other historic communities have been abandoned and are now ghost towns, including Greaterville, Pantano, and Total Wreck in the Cienega Valley, Twin Buttes and Helvetia in the Upper Santa Cruz Valley, Cerro Colorado in the Altar Valley, the Silverbell mining camp in the Avra Valley, and Clarkstown on the west side of the Tohono O’odham reservation. These reflect the importance of mining silver, gold, lead, and copper in Pima County’s history.
- While there are numerous historic trails, stagecoach routes, and roads throughout Pima County, three are especially important. The trail that is now the Juan Bautista de Anza National Historic Trail was used by Captain Juan Bautista de Anza on his

1775–1776 colonizing expedition to the San Francisco Bay. The Camino del Diablo linked Sonora with southern California during the eighteenth and nineteenth centuries. Finally, the Butterfield Trail, an overland mail route between St. Louis and San Francisco was used between 1858 and 1861.

- An increasing number of traditional cultural places have been identified, many of which are important to traditional communities like the Tohono O’odham Nation, Pascua Yaqui, and other Native American Tribes. Other sites important to the Mexican American community and other traditional communities have also been identified. Traditional cultural places may include features of the natural environment such as springs, rivers, and mountains, as well as ancestral sites and places of traditional use and ceremony.

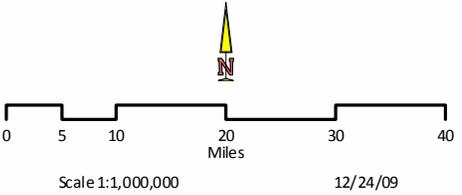
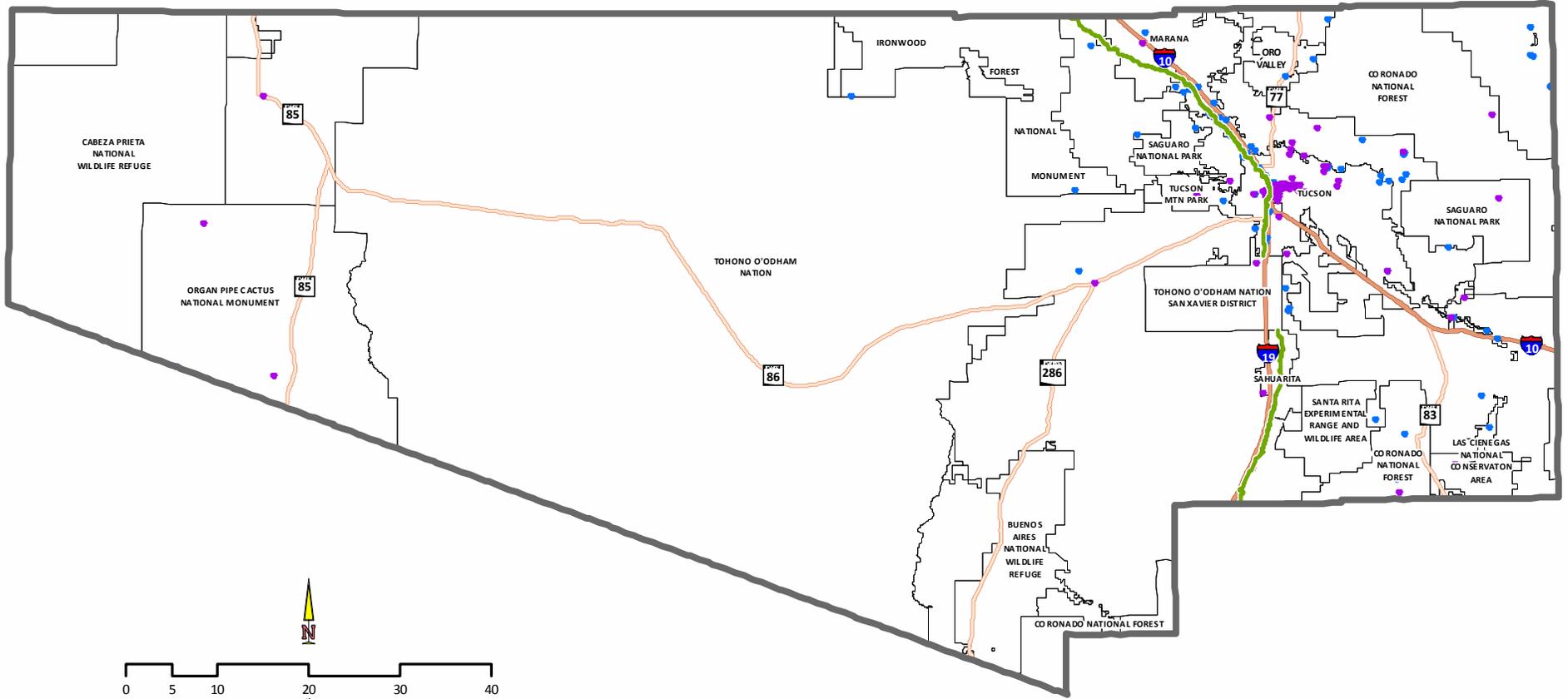
3.10.3 Priority Cultural Resources

From more than 4,000 archaeological sites and over 4,000 historic buildings and structures, the Technical Advisory Team selected 64 individual archaeological sites, 27 clusters or “complexes” of archaeological sites representing repeated use of the landscape over thousands of years, and 138 historic resources as Priority Cultural Resources. These Priority Cultural Resources properties are high value cultural resources that, because of their importance to the history, heritage, living traditions, and culture of the citizens of Pima County, are deserving of conservation. Areas modeled to have high cultural resources sensitivity overlap many of the Priority Cultural Resource site locations, which are shown on Figure 3.16.

3.10.3.1 Summary of Resource Base

The selected priority cultural resources consist of individual archaeological sites and districts, individual historic sites and districts, archaeological and historic site complexes, and all cultural resources NRHP and SRHP listed, such as:

- ancient Native American villages, including some of the oldest sites with evidence of irrigation agriculture in North America;
- a Spanish Colonial church, the Mission church of San Xavier del Bac, a National Historic Landmark, and known internationally as one of the finest examples of Spanish Colonial ecclesiastical architecture;
- Spanish, Mexican, and U.S. Territorial Era ranches, such as the Canoa Ranch in the Santa Cruz Valley and the Empire Ranch in the Cienega Valley;
- the nineteenth century ruins of Fort Lowell, a frontier military base, that played an instrumental role in the “Indian Wars” of the mid- to late nineteenth century before Arizona statehood;



- Archaeological Priority Sites
- Historical Priority Sites
- Anza Trail Route
- Administrative Boundary

Figure 3.16
Priority Cultural Resources

- old mining communities, such as the Kentucky Camp, Helvetia, Silverbell, and Rosemont;
- residences and historic neighborhoods of both the local Sonoran style of architecture and the imported Victorian styles that followed the coming of the railroad to Tucson in 1880;
- churches, school houses, commercial establishments, bridges, and other transportation related features that followed statehood in 1912;
- several natural area parks, including the Tucson Mountain Park created in 1929 and Colossal Cave developed in 1934 by the Civilian Conservation Corps; and
- traditional cultural places such as Tumamoc Hill and El Tiradito.

3.10.3.2 Potential Threat to Resource Base

The record of the past is threatened by a variety of sources, both natural and human caused, but principally from land use and development. Research shows that many cultural resources considered to have extraordinary value are located within the Tucson city limits, as well as those of incorporated Marana, Oro Valley, and to a lesser extent, Sahuarita. Potential future threats are greatest where residential development has extended beyond the City of Tucson and into unincorporated Pima County and the surrounding municipalities.

Both known recorded sites and predictive modeling suggest that many important cultural resources are also located in unincorporated Pima County. These areas of high sensitivity are threatened by growth along the Santa Cruz River Corridor, the northwest side of Tucson, in the Avra Valley west of the Tucson Mountains, the Altar Valley south and west of the San Xavier District, and the Pantano Wash and Rincon Creek areas south of Saguaro National Park East.

3.10.3.3 Correlation of Cultural Resources with Biological Resources

Pima County has conducted GIS analyses comparing the location of high value cultural resources with data on high value natural resources also collected for the SDCP. Data layers mapping core biological, habitat, and riparian areas were compared with the location of priority cultural resources to determine where they co-occur and where they are distributed separately. This was done to assist in identifying opportunities for and challenges to cultural resources conservation.

Initial findings indicate that priority cultural resources co-occur with important riparian areas both within and outside the urban core. However, due to greater levels of cultural resource survey and recording of actual site locations, more of the identified priority

archaeological sites are located within the urban core where present-day natural resource values are lower than in the rural countryside. For the archaeological site complexes, the reverse is true, and the direct relationship between high natural resources values and high cultural values is apparent.

Most historic resources within Pima County, principally historic public buildings, homes and neighborhoods, are located within the Tucson metropolitan area, although a small number are distributed in areas with high natural resource values in the surrounding rural countryside. These historic sites tend to be the historic ranch buildings associated with homestead claims filed in the late 1800s on lands with high natural resource values typically along river courses or near springs. Often these areas show repeated use by different peoples over thousands of years. One example is Agua Caliente Ranch where the natural hot springs attracted successive use and nearby settlement by Archaic, Hohokam, O'odham, and Apache groups, followed by American settlers and ranchers who homesteaded the property that was also used by troops from Fort Lowell in the late 1800s. This multi-layered site with its archaeological values and historic ranch buildings is now preserved by Pima County as the Roy P. Drachman Agua Caliente Park.

Because of the frequent correspondence of lands with high natural and cultural values, most of the priority cultural resources are located on private property or involve joint public/private ownership. This preliminary assessment indicates that high value cultural resources co-occur with high value natural resources in some rural undeveloped places and not in others, especially in what is today the urban core. Some are on private land and some are on publicly owned lands.

3.10.3.4 Conservation Strategies

Pima County and the Cultural and Historic Resources Technical Advisory Team have recommended strategies to the Pima County BOS to protect the County's cultural resources for the benefit of future generations. These recommendations have historically been followed by the BOS to conserve these resources. The majority of Priority Cultural Resources occurs in the urban core and fall under the jurisdiction of other local governments. Some, including many of the archaeological complexes, cover thousands of acres, whereas others, particularly the individual historic sites, are located on less than one acre. The conservation of these varied cultural resources requires the development and implementation of a variety of conservation strategies at different scales and time frames. The basic initial strategies are:

- working cooperatively with Federal, State, and local governmental entities towards achieving shared conservation goals and comparable policies and protections for cultural resources
- developing a regional inventory, recordation, designation, and management strategy

- purchasing land and easements containing high value priority cultural resources and other cultural and historic resources for conservation purposes when adequate public funding is available
- creating an incentive program to encourage private landowners to voluntarily preserve and protect cultural resources that are on their land or that compensate them for selling or conveying rights to develop lands containing cultural resources
- using existing land-use policies and regulations in a consistent manner to ensure that when public and private land is developed, cultural resources are considered as a part of the development review approval process
- informing and educating the public about the past and engaging citizens in saving Pima County's collective heritage for the future

3.10.3.5 Considerations for Future Analysis

The research that Pima County has conducted on cultural resources has enabled a comparative analysis of different land conservation scenarios and their effects on cultural resources. The variables proposed for such analyses are:

- periodic reassessment of defined priority cultural resources with current inventory of recorded archaeological and historic sites.
- periodic reassessment of predictive modeling of cultural resource sensitivity areas.
- numbers of all recorded archaeological sites. Counts and acreage of all known archaeological sites from all time periods.
- numbers and acres of priority archaeological sites. Frequency and size of all known archaeological sites the County has identified as having extraordinary importance to the history and culture of the citizens of Pima County.
- numbers and acres of priority archaeological site complexes. Frequency and size of areas containing dense clusters of archaeological sites that have been identified as having extraordinary importance to the history and culture of the citizens of Pima County.
- numbers of priority historic sites. Counts and acreage of all known historic sites that the County has identified as having extraordinary importance to the history and culture of the citizens of Pima County.
- acres of modeled archaeological sensitivity zone. The number of acres predicted to have high and moderate sensitivity (combined) for all archaeological sites.

Quantitative analysis of traditional cultural places is not proposed at present because information on the locations of these cultural resources is so limited and because few of the known places with these values have been identified as occurring on vacant private or State land in eastern Pima County.

3.10.4 Land Status and Legal and Regulatory Framework

This section describes the primary laws and regulations that currently apply to cultural and historic resources within Pima County. For the purposes of this discussion, Pima County lands are divided into three zones by land status representing varying levels of legal protection for cultural resources. Legal protection of cultural resources varies according to jurisdiction, according to a gradient from highest level of protection on Federal lands to least mandated protection on private lands.

3.10.4.1 Federal Land

The Antiquities Act of 1906 was the first piece of preservation legislation passed by Congress providing a legal means to ensure the preservation of archaeological sites on Federal lands. The National Historic Landmark program was created in 1935 under the Historic Sites Act establishing a program whereby the nation formally recognizes places of national historic importance.

It was not until 1966 that the national historic preservation program was created in its present form with the adoption of the NHPA. The NRHP created a means by which cultural resources can be evaluated for their significance and be recognized for their historical importance on the local, regional, and national levels. The NHPA also created the Advisory Council on Historic Preservation to advise Congress and the President on historic preservation issues, and it established State Historic Preservation Offices in each state. Furthermore, its implementing regulations, 36 CFR 800, define the process by which Federal agencies must comply with the provisions of the Act.

NEPA compliance with its provisions, together with those of the NHPA, requires consideration of impacts to a wide variety of cultural resources, as well as other aspects of the human environment in the planning of federally sponsored actions. Both the NHPA and NEPA apply not only to Federal lands but also to Federal undertakings (including projects, activities, or programs funded by Federal agencies or those requiring a Federal permit, license or approval) that occur on non-Federal lands.

Additional Federal laws that require protection of cultural resources on Federal land include the Archaeological Resources Protection Act 1979 (as amended) and the Native American Graves Protection and Repatriation Act 1990 that protects Native American burials and funerary objects. Finally, the Wilderness Act of 1964 allows Federal lands

that meet specific conditions to be set aside for conservation purposes, thereby protecting natural and cultural resources for the future.

3.10.4.2 State and County Land

State and County lands are covered by State law that protects cultural resources, specifically the Arizona Antiquities Act and the Arizona State Historic Preservation Act, both of which affect State Trust Lands. State Trust Land was created as a result of the acceptance of the State of Arizona into the United States in 1912. State Trust lands are not public lands in the same sense as Federal public lands, but are administered by the Arizona State Land Department for the purpose of generating revenue for the State school system and other beneficiaries through land sales. State Trust lands are a commodity, and the mission of the Arizona State Land Department is to derive funds from leases or sale of this commodity at the highest price for the highest and best use. Cultural resources are considered in the disposition process, as are means to mitigate impacts to these resources. These lands are subject to State laws that require State agencies to abide by regulations that control the effects of agency actions on cultural resources.

Arizona State Parks, such as Catalina State Park and County Parks lands such as Tortolita Mountain, Tucson Mountain Park, Colossal Cave, and the Cienega Creek County Natural Preserve are established with the specific goal of protecting their natural values and cultural resources for the benefit of the public. Catalina State Park has been partially surveyed and the Sutherland Wash Archaeological National Register District was created within its boundaries. As a political subdivision of the State of Arizona, Pima County is subject to the same State statutes that protect cultural resources on State lands. Cultural resource inventories have been completed for certain County-owned lands, but not all. For example, grant funds allowed the cultural resource survey to be completed on lands around Colossal Cave, resulting in its NRHP listing, and cultural resources within Cienega Creek Natural Preserve have been recorded as a result of private research; however, complete inventories of the Tucson and Tortolita Mountain parks and other County open space preserves have not yet occurred. Nonetheless, State and County laws and policies serve to protect cultural resources in these areas from both public and private actions.

The Arizona State Historic Preservation Act (ARS 41-861 et seq.) is modeled after the NHPA. This authority created the SRHP and requires State agencies to inventory, evaluate, and mitigate any impacts to cultural resources on State Trust lands and lands owned or controlled by the State of Arizona. The Arizona Antiquities Act (ARS 41-841 et seq.) enables the Arizona State Museum to control archaeological investigation on State lands, including State Trust lands, County and municipal lands, and lands owned by other political subdivisions of the State of Arizona. Finally, ARS 41-844 protects unmarked human graves and their contents against unauthorized disturbance on lands owned or controlled by the State of Arizona, and the law requires that the Arizona State

Museum be notified of any burial discoveries so that groups who claim cultural affinity to these remains can arrange for their repatriation.

Pima County recognized the applicability of these State laws to its own actions and lands, and adopted Resolution 1983-104 requiring the protection and mitigation of impacts to cultural resources affected by County public improvement projects. This resolution was recently reaffirmed with the adoption of BOS Policy C.3.17.

3.10.4.3 Private Land

Arizona Burial Law (ARS 41-865) protects all human remains and funerary objects on private lands. Should an unmarked human grave be encountered on private land in the State of Arizona, state law requires that the human remains not be disturbed and that the Arizona State Museum be notified of the discovery. Once the remains are removed with authorization from the Arizona State Museum, development may proceed. This law protects the treatment and disposition of human remains and associated funerary items discovered on private land, but it does not preclude the future development of the site on which the graves are located.

Cultural resources are also protected on private land where local governments have included these protections in local law and land use regulations. Pima County has formally addressed the protection of cultural resources on private land in its development regulations since 1985, and more recently addresses cultural resources in its Comprehensive Plan Update of December 2001. The Pima County Comprehensive Plan promotes the protection and conservation of cultural resources. Pima County also has cultural resources requirements in the County code that regulates the conduct of development through its conditional approval of land rezonings, development plans, and when grading permits are issued prior to construction. While in-place preservation of cultural resources is always preferred, the County can require the mitigation of impacts on cultural resources whereby information is recovered from the cultural resources prior to their destruction through development. These policies and requirements apply only in the unincorporated portions of Pima County.

There are limitations to Pima County's code requirements. The State's subdivision law allows splitting and development of five or fewer lots without having to meet subdivision requirements. Although State burial laws apply to unregulated subdivisions, Pima County's cultural resources requirements do not apply in these situations, and therefore cultural resources within areas of unregulated subdivision are not protected. This means that cultural resources may be destroyed before they are even recorded.

Several other local governments within the County also address the preservation of cultural resources. The Town of Oro Valley, for instance, has a cultural resources preservation ordinance that is tied to its development review process. The Town of

Marana also has an ordinance that imposes preservation requirements on development projects in its jurisdiction.

The City of Tucson has a Historic Zone ordinance and an Administrative Directive that protect cultural resources, but the City has not adopted the same legal means as the County to require surveys and mitigation of impacts in advance of development unless it is a condition of rezoning. At this time, the Town of Sahuarita has no cultural resources preservation law, nor does it currently consider cultural resources preservation in its development review process.

In summary, cultural resources on private lands are protected by law under certain circumstances and not in others depending on which jurisdiction has authority. When the local law does apply, it almost always means that some form of mitigation is employed to control destruction; however, in-place preservation and conservation of cultural resources for the future is often not a primary consideration.

3.11 Recreation

3.11.1 Background and Community Values

The southern Arizona deserts, canyons, and mountains provide the backdrop for a wide variety of recreation pursuits, all of which benefit Pima County communities in many ways. Outdoor recreation promotes the physical and mental health of participants and generates substantial economic benefits (e.g., expenditures by visitors, purchase of equipment, travel) for Pima County. The amenities provided by the public lands, where most outdoor recreation occurs, contribute significantly to Pima County's tourist industry, to the interest in employers locating there, and to residents' quality of life.

Pima County residents' involvement in and support for outdoor recreation are demonstrated in the 2008 Statewide Comprehensive Outdoor Recreation Plan prepared by Arizona State Parks to guide the state priorities for outdoor recreation and open space grant projects (Arizona Office of Tourism 2008). A public survey that supported the Statewide Comprehensive Outdoor Recreation Plan reported that about 70 percent of the households in Pima County said they visited a park or recreation area an average of 7.4 times in the past three months. Eighteen percent said they travel more than 50 miles to get to the recreation area they visit the most often; 30 percent travel 6 to 50 miles; 34 percent travel 1 to 5 miles; and 18 percent travel less than one mile. Forty-two percent of respondents reported that they would go more often, if the parks were closer. Residents were asked to prioritize which type of parks should receive limited available park funding. Forty-two percent of the respondents chose nature-oriented parks (such as Tucson Mountain Park), 24 percent chose open space (large or small with development usually limited to trails), 19 percent chose neighborhood parks (a small park with just a few facilities such as a playground or basketball court), and 15 percent chose multi-use

parks (such as Reid Park). Regarding land acquisition for open space, 77 percent preferred to see acquisition dollars go toward buying large open spaces with habitat for wildlife, while 22 percent preferred the dollars go to acquiring open spaces between housing developments.

3.11.2 Recreation Activities and Use in Pima County

As Pima County continues to grow, there is increasing demand for outdoor recreation opportunities. Recognizing the critical relationship between land conservation for biological resources and recreational land uses, Pima County formed a Recreation Technical Advisory Team to address the significance and impact of outdoor recreation activities to the SDCP. The Recreation Technical Advisory Team, composed of individuals from land managing agencies, recreation user groups, recreation consulting firms, and the University of Arizona, developed a broad mission: “To provide expert information on issues arising from existing and growing demand for natural resource based outdoor recreation in Pima County, so that high quality recreational opportunities and experiences are available to the public while achieving the goals of the SDCP.”

The Recreation Technical Advisory Team conducted surveys, participated in meetings and workshops, and developed the following list of representative outdoor recreational activities that occur in Pima County:

- birding
- camping, developed sites (tent/recreational vehicle camping in designated campgrounds or sites)
- camping, dispersed (including driving to, backpacking to camp site)
- caving/mineshaft exploration
- cultural/historical resources observation
- dog walking
- equestrian use (individuals, group rides, commercial rides)
- fishing
- hang gliding, parasailing, hot air ballooning, ultralight flying
- hiking (including trail running, orienteering)
- hunting (rifle, shotgun, handgun, archery)
- mineral collection/rockhounding
- mountain biking (including variations such as fat-tire in-line skating)
- native plant and animal collecting, primarily herpetofauna
- natural history study/appreciation (wildlife and native plant study, photography)
- off-highway vehicle use (dirt bike, 4-wheel drive, all-terrain vehicle, commercial tours)
- picnicking

- rock climbing
- scenic driving
- stargazing/astronomy
- swimming, wading, water-based activities (in creeks, pools, lakes)
- target shooting

3.11.3 Potential Impacts and Benefits of Recreation

Increased recreational use throughout Pima County is a growing concern among public land managers faced with anticipating the public's need for recreation activities and settings, as well as visitor use and overuse, crowding, increased crime, and vandalism. Managers must have regard for the resource base while considering visitor satisfaction and enjoyment.

The above representative recreational activities have varying levels of associated or potential impacts that require special consideration for the effective management of lands contributing to the CLS and Pima County MSCP. Even seemingly benign outdoor activities such as hiking and wildlife viewing can undermine efforts to protect biological resources. Recreationists make tremendous contributions to natural resource conservation; license, permit, and other use fees for activities such as camping, hunting, and fishing generate revenue (Pima County 2001e). Recreationists offer a significant benefit by providing valuable information to land managers, who have limits on the extent to which they are able to monitor all lands under their purview.

3.11.4 Pima County Policies and Practices

Outdoor recreation policies have been addressed by the SDCP Mountain Parks Element, the Eastern Pima County Trails System Master Plan (hereafter called the Master Trails Plan), the Pima County Comprehensive Plan, and by voter-approved Open Space Bond initiatives. It has also been a common practice for Pima County's NRPR to cooperate with other land managing agencies and interested non-profit organizations whenever possible and appropriate. These policies and planning initiatives are discussed briefly here.

3.11.4.1 Mountain Parks Element of the SDCP

Pima County's parks system began with the establishment of Tucson Mountain Park in 1929. The Mountain Parks Element of the SDCP identifies the characteristics of the natural resource-based parks and makes specific recommendations for their expansion, both in land area and number of mountain parks. It also proposes conservation and/or acquisition actions, some of which have already occurred, in the Cienega Creek Preserve area, Colossal Cave Mountain Park, Davidson and Buehman canyons, the Santa Rita Mountains, Canoa Ranch, the Cerro Colorado Mountains, Tucson Mountain

Park, Tortolita Mountain Park, and Catalina State Park. This expansion and conservation plan will be implemented in concert with ranch and riparian area conservation. Las Cienegas National Conservation Area and the Ironwood National Monument were designated in 2000.

3.11.4.2 Eastern Pima County Trails System Master Plan (Master Trails Plan)

The Master Trails Plan identified acquisition priorities for the development of a trail network for pedestrians, equestrians, bicyclists, and other non-motorized users (Pima County 1996). The plan for the trail network is to expand on the existing and planned river park system to connect with all major public lands. Priority selections for these recreational trails take advantage of locations that offer the community multiple benefits such as flood control, groundwater recharge, wildlife habitat preservation, and open space protection.

The overriding consideration in the implementation of the proposed network is public ownership of trails and trail access points. This can be accomplished in a variety of ways: including the purchase of property, designation of County rights-of-way as trails, dedication of private lands for trails during the rezoning process, or exchange of land. The establishment of conservation and trail easements and use of trail-use agreements or land leases may also help in some limited cases. See Figure 3.13 for a map of trails in Pima County.

3.11.4.3 Pima County Open Space Bonds

The 1986, 1997, and 2004 Pima County bond initiatives for open space protection drew strong support from voters in Pima County. Money from the 1997 bond focused on the purchase of lands to increase Tucson Mountain Park, Colossal Cave, and Tortolita Mountain Park, as well as the acquisition of other undeveloped lands. The 2004 open space bond commits funding for the following outdoor recreation-related investments:

- \$174,300,000 for the purpose of open space and habitat protection. Included are urban open space parcels requested by the City of Tucson and the towns of Oro Valley and Sahuarita; community open space parcels in and around the Tucson basin; and habitat protection priority lands (see Habitat Protection Priorities Map, Appendix L of the Pima County MSCP). Protection of these open space lands will be achieved by fee simple acquisitions and by conservation easements.
- \$96,450,000 for the purpose of acquiring, developing, expanding, improving, and equipping new and existing parks and recreational facilities such as athletic fields, community centers, libraries, historic and cultural facilities, and trails.
- \$46,200,000 for river parks and flood control improvements.

As of August 2010 most the money for open space acquisition funds had been spent on the acquisition and lease of 47 properties (Table 3.7).

**TABLE 3.7
BOND-FUNDED OPEN SPACE ACQUISITIONS**

Property Name	Acres		Acquisition Cost (\$) ^b
	Fee	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	4		85,586
Pacheco	20		241,010
Serr	10		94,776
Belvedere	72		615,972
Hytntington	4		72,163
Firkins	1		30,987
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 3.7
BOND-FUNDED OPEN SPACE ACQUISITIONS**

Property Name	Acres		Acquisition Cost (\$) ^b
	Fee	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		3,590,000
M Diamond	604	9,584	400,000 ^c
Total	49,960	136,864	164,822,194

^a Lease acres include State Trust, USFS, and BLM lands.

^b Does not include Due Diligence costs, which have 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 Ridge Mining Corporation.

3.11.4.4 Pima County Comprehensive Plan

The Pima County Comprehensive Plan addresses policies for the regional trail system. The Pima County Trails network will expand on the existing and planned river park system, and is intended to include natural tributary washes and upland segments, and road and utility rights-of-way that together form an interconnected system linking urbanized areas with surrounding public reserves. The Regional Trail System Policies are as follows:

- Dedication of High Priority Trail System Elements: High priority trail system elements, as identified in the Master Trails Plan and approved by the Department of Natural Resources, Parks and Recreation, shall be given a high priority for acquisition by Pima County for the regional trail system. Dedication of particular trail system elements shall be required as a condition of rezoning approval. Examples of high priority trail system elements include, but are not limited to, trails identified in the Master Trails Plan, trail corridors that link individual public lands units, connect public lands with existing or planned river parks, create local trail linkages to parks, schools, or activity centers, or provide public access to established public lands trails.
- Regulatory flood-prone areas, which are dedicated as drainage easements to the RFCD and which are identified as candidate trails on the Master Trails Plan, shall also be dedicated to Pima County to allow additional uses such as recreational and equestrian activities.
- Dedication of high priority trail corridors, trail access points, and associated staging areas for public use shall be negotiated by the Department of Natural Resources, Parks and Recreation. Any fencing of the trail corridor shall meet the specifications of

the Department of Natural Resources, Parks and Recreation and said specifications shall be included as a condition of rezoning or specific plan approval.

- Trails Access—Vehicular Access to Public Land Trailheads: Vehicular access to trailheads at public preserve boundaries shall be promoted, based on a determination by the public lands manager and the Department of Natural Resources, Parks and Recreation. In those cases where road access to public lands trailheads is deemed critical, dedication of public road rights-of-way and associated parking and equestrian staging areas shall be required as a condition of rezoning or specific plan approval.
- Trails within the Project Site: (1) Where appropriate to the scale and nature of the planned development and its location relative to inventoried trail system elements, trails and paths within the project site shall connect with the regional system to provide open space and recreational opportunities for planned community residents. The developer and the Department of Natural Resources, Parks and Recreation will determine the application of this policy; (2) If the project site contains a route identified in the Master Trails Plan that provides irreplaceable access to a public preserve boundary (or other valuable access), public access through the site shall be provided.

3.11.4.5 Intergovernmental Cooperation

Pima County has built and maintained trailheads that access trail systems in the Coronado National Forest and Saguaro National Park. With funding and support from Arizona State Parks, Pima County opened the Pima Motorsports Park, a facility where motorized recreation and education can take place. Pima County participated in the Tucson Basin Land Managers, a consortium of agencies and organizations including the BLM; USFS; AZGFD; USFWS; National Park Service; City of Tucson Natural Resources, Parks, and Recreation Department; Arizona-Sonora Desert Museum; and Arizona State Parks.

3.11.4.6 Cooperative Activities with Non-profit Groups and Individuals

Dozens or more non-profit organizations help with outdoor recreation plans and projects in Pima County, from hands-on clean-up projects (e.g., Scouts, Friends of Cienega Creek) to helping plan for the future (Pima Trails Association's work on the Trail System Master Plan and other organizations represented on the Recreation Technical Advisory Team). Several non-profit groups have educational and research facilities on some of the County's natural resource parks (Arizona-Sonora Desert Museum, Parklands Foundation, Sonoran Arthropod Studies Institute). Specialized hobby groups, such as hiking, birding, mountain-biking, and equestrian clubs lead trips into the parks for their

members and the public. The parks and outdoor recreation also benefit from the volunteer support from individuals, such as the campground hosts at Gilbert Ray.

3.11.5 Stewardship of Recreation Resource Areas

This section provides a brief description of reserve lands in Pima County with outdoor recreation resources. The Pima County NRPR serves the urban and rural residents of Pima County by providing recreational destinations and services. Their mission is to conserve the Sonoran Desert and enhance the urban environment while providing quality recreational, educational, and leisure activities. NRPR presently manages 41 urban parks, as well as park facilities, which include 12 community centers, 10 pools, two splash pads, six dog parks, 86 ball fields, 40 playgrounds, four shooting and archery ranges, and two campgrounds. Open space properties include 14 ranches, Colossal Cave Mountain Park, Sweetwater Preserve, Tortolita Mountain Park, and Southeast Regional Park. The 41 urban parks include Agua Caliente Park, Cienega Creek Natural Reserve, Canoa Ranch, and Catalina Regional Park (totaling 13,730 acres) and another 133,702 acres of land base managed by NRPR. At present, 114 miles of river park and greenway trails are in operation, with approximately 50 additional miles under development or planning. NRPR also provides approximately 250 miles of single-track multi-use trails in addition to a 55-mile loop.

Not all of these are public and they all have varying levels of allowed recreational uses and public access. Table 3.8 lists these areas by managing entity, name, and size.

**TABLE 3.8
RESERVES AND OUTDOOR RECREATION RESOURCE AREAS IN PIMA COUNTY**

Managing Entity	Reserve Name	Acres
National Park Service	Organ Pipe National Monument and Wilderness	330,643
	Saguaro National Park, Rincon Mountain District Wilderness	67,409
	Saguaro National Park, Tucson Mountain District Wilderness	24,238
USFS	Butterfly Research Natural Area	1,129
	Catalina State Park (managed in cooperation with Arizona State Parks)	5,502
	Coronado National Forest	240,376
	Mt. Wrightson Wilderness	3,975
	Pusch Ridge Wilderness	54,286
	Rincon Mountain Wilderness	36,908
	Santa Catalina Research Natural Area	881
USFWS	Buenos Aires National Wildlife Refuge	117,010
	Cabeza Prieta National Wildlife Refuge and Wilderness	400,549
BLM	Baboquivari Peak Wilderness	2,059
	Coyote Mountain Wilderness	5,157
	Ironwood Forest National Monument	111,663
	Las Cienegas National Monument	32,382
	Sonoita Valley Acquisition Planning District	4,304

**TABLE 3.8
RESERVES AND OUTDOOR RECREATION RESOURCE AREAS IN PIMA COUNTY**

Managing Entity	Reserve Name	Acres
Bureau of Reclamation	Bureau of Reclamation Wildlife Mitigation Corridor	2,712
	Posta Quemada Acquisition	150
Department of Defense	Barry M. Goldwater Gunnery Range	57,457
State of Arizona	Lands within Ironwood Forest National Monument	46,744
	Lands within Las Cienegas National Conservation Area	635
	Santa Rita Experimental Range	53,130
	Sonoita Valley Acquisition Planning District	65,626
	Tumamoc Hill Research Station	539
Pima County	Agua Caliente Regional Park	111
	Arthur Pack Regional Park	515
	A-7 Ranch	41,250
	Bar V Ranch	13,495
	Bingham Cienega Natural Preserve	273
	Buckelew Ranch	4,396
	Canoa Ranch	4,895
	Clyne Ranch	907
	Cienega Creek Natural Preserve	4,268
	Cienega Corridor	1,687
	Colossal Cave Mountain Park	2,416
	Diamond Bell Ranch	30,900
	Empirita Ranch	2,713
	Honeybee Biological Corridor	677
	King 98 Ranch	4,330
	Rancho Seco	37,111
	6 Bar Ranch	13,619
	Pima County Parklands Foundation	156
	Sands Ranch	15,184
	Sopori Ranch	16,020
Sweetwater Trails Park	703	
Southeast Regional Park	3,004	
Tortolita Mountain Park	3,924	
Tucson Mountain Park	20,482	
West Branch	73	
Town of Oro Valley	Honey Bee Biological Corridor	320
Town of Marana	Tortolita Preserve	2,393
Tucson Audubon Society	Mason Audubon Center	20
	Nanini Sanctuary	1.8
Total Acres		1,890,605

Pima County also has many small residential and commercial community recreational areas that are not managed by the NRPR. These parks add to the recreational opportunities within the County and to the overall recreational assets available to the public.

Figure 3.17 shows locations of the largest of these areas. A more detailed description of these areas and the activities that are allowed within them can be found in Connolly et al. (2000). Pima County recently adopted a management plan for Tucson Mountain Park, which reflects the conservation goals of the SDCP, and is similarly developing a management plan for Cienega Creek Natural Preserve.

3.11.5.1 Federal Land

The Federal agencies managing national refuges, forests, parks and monuments, and other lands within Pima County each have different mandates for management. The refuges and wilderness areas offer permanent protection for biological resources and mandated management plans. Other lands, such as unreserved areas of Coronado National Forest and BLM lands come under a multiple-use mandate and more intensive activities, such as resource extraction, are allowed.

3.11.5.2 State of Arizona Land

Catalina State Park is managed by Arizona State Parks, and numerous State Trust properties, most not listed above, are held and managed by the Arizona State Land Department. Ranchers hold grazing leases on many of these State Trust properties, which are frequently used by hunters, hikers, and other recreationists.

3.11.5.3 Pima County Land Management for Resource Conservation

Pima County NRPR manages County mountain parks and natural preserves, and several other properties for the purpose of resource conservation. The department performs trail maintenance within resource parks to reduce recreational impacts. Wildcat trails are covered, vegetation is replanted, and “no access” signage is installed. Law enforcement in parks and preserves is provided by the Pima County Sherriff’s department.

Tucson Mountain Park and Colossal Cave Mountain Park both contain commercial enterprises and experience heavy recreational use. Other areas such as Bingham Cienega and Cienega Creek Natural Preserves have limited allowed recreational uses. These preserves have sensitive riparian areas and perennial water flows. Bingham Cienega is not open for recreational use, but can be accessed by appointment, whereas Cienega Creek has limited access. Off-highway vehicles are not allowed at Cienega Creek, although occasionally all-terrain vehicles will enter the preserve through breached fences or through unlocked gates along utility corridors.

The RFCD owns property along the major flood-prone washes in the Tucson basin. Much of this land is unmanaged, and equestrian and off-highway vehicle use is prevalent on several of these properties, including the Tanque Verde, Cañada del Oro, and Bear Canyon areas.

Pima County has purchased several ranches for the purpose of open space and resource conservation. Examples include the A7 Ranch, Lord's Ranch and the Buckelew Ranch (see Figure 3.11) and greater detail of these lands can be found in Section 3.9, Ranching and Agriculture. Besides those listed in Table 3.7 above, other land areas have significant recreational opportunities or potential, including more urban and developed County parks such as the Sweetwater Preserve. Examples of areas managed by Pima County for resource conservation are provided below.

Arthur Pack Regional Park is in the rapidly growing northwest portion of the Tucson metropolitan area, and is within the area previously proposed as critical habitat for the pygmy-owl. It is located within the Tortolita Fan drainage area and characterized by the ironwood plant community.

Canoa Ranch, in Green Valley, preserves significant cultural and biological resources along the Santa Cruz River, including the historic Canoa Ranch, which boasts intact, historic structures, and the historic Juan Bautista de Anza camp. It offers natural resource based recreation potential, but does not yet have a management plan.

Cienega Creek Natural Preserve stretches from Colossal Cave Road on the northwest to Empirita Ranch on the southeast, including a 12-mile stretch of Cienega Creek. It was acquired to preserve riparian habitat, provide natural flood storage, and facilitate ground water recharge. Six miles of perennial stream flow are found within the preserve. Cienega Creek is designated as a "Unique Water of Arizona" and offers a variety of recreational opportunities.

The Cienega Creek Natural Preserve's lush vegetation and scenic values, clean running water, outstanding mountain vistas, and sense of solitude and natural quiet make it a very attractive place to visit. The management plan limits visitors to 50 people per day, and a permit is required to enter the preserve. Resource protection is the principal imperative; therefore, recreational activities are limited to those that do not adversely impact its sensitive resources, including:

- hiking, walking, backpacking, picnicking and related activities;
- railroad train watching, photography and painting;
- non-intrusive bird and wildlife observation, photography and painting;
- wading in the creek's pools and stream;
- scientific research and environmental education; and
- other low-impact recreational or educational activities.

Colossal Cave Mountain Park, managed by The Pima County Parklands Foundation, lies 14 miles southeast of Tucson in the foothills of the Rincon Mountains. It preserves a significant riparian area, is the site of the historic Posta Quemada Ranch, and represents extraordinary geological characteristics including a mosaic array of 20 different geologic units. Coronado National Forest borders part of the eastern boundary. Land within the park is owned by Pima County, the Parklands Foundation, or is included in a grazing lease with the Arizona State Land Department. In 1992, Colossal Cave Mountain Park was listed on the MRHP. Private individuals operate the park under agreement with the Parklands Foundation. Colossal Cave Mountain Park offers a wide range of recreation opportunities, including picnicking, birdwatching, hiking, horseback riding, and camping.

Pima County NRPR currently manages approximately 15 miles of linear parks along the Rillito and Santa Cruz rivers in the Tucson metropolitan area. These lands were originally purchased for flood-control purposes and have since been enhanced to provide recreational opportunities. Existing river parks are part of a larger vision for Pima County management of most washes in the Tucson basin. This vision is articulated in the Master Trails Plan and in the Pima County River Parks Master Plan. Within this proposed system lies the potential for creation of interconnected biological linkages between areas of publicly held land.

Roy P. Drachman—Agua Caliente Regional Park is nestled between the Catalina and Rincon Mountains in the northeast part of Tucson. A natural warm spring surfaces on the property and provides water to a series of artificial ponds. The park is an important water source for a wide variety of wildlife. Rare perennial spring flow supports an aquatic ecosystem that is dominated by non-native species. Historic significance is high; it was used by prehistoric peoples and in the 1880s a resort was built to cater to the infirm. The majority of the park is included in the Hohokam Whiptail archaeological site.

Tortolita Mountain Park exemplifies the Sonoran Desert in a nearly pristine condition in northern Pima and southern Pinal counties. Due to the dramatic regional growth of development, urban pressures are expected to impact Tortolita Mountain Park. The reserve is currently undeveloped with no legal public access to the park.

Tucson Mountain Park is the oldest park within the Pima County reserve system. Established in 1928 to preserve and protect the natural and scenic resources of the Tucson Mountains, the park includes the Bureau of Reclamation Tucson Mitigation Corridor. Although physical development is limited, recreational use continues to increase and is permitted with few restrictions. The park includes 26 miles of trails open to hikers, equestrians and mountain bicyclists, an archery range, a rifle range, and a campground and picnic areas. Future management will likely give priority to Covered Species since areas of previously proposed critical habitat for the pygmy-owl and habitat for other Covered Species occur there. Development of a long-term management plan was finalized in 2008 (McGann and Associates 2008).

3.12 Mineral Resources

This section discusses Pima County's mineral resources and mining in terms of their historic influence, known resources, regulatory context, and the role of the mining industry in the local economy. The information included here is based on reports and sources listed in Chapter 8.

3.12.1 Overview and Historic Perspective

After Arizona became a territory in 1853, southern Arizona was actively prospected. Silver, copper, and gold were discovered around that time, bringing a rush of prospectors from Mexico and elsewhere. Pima County's unique and complex geologic history has resulted in large copper deposits and many other minerals. Three important deposit areas, Ajo, Silverbell, and Mission–Pima, are still actively mined. Limestone is mined at the north end of the Santa Rita Mountains. Metallic commodities produced in Arizona include copper, gold, silver, molybdenum, and lead, listed in order of decreasing value.

Mining has been an important influence in the development of Pima County. The first mining company in Arizona, the Arizona Mining and Trading Company, was created in 1854 specifically to mine the copper ores of Ajo. Before this, the Tohono O'odham and their antecedents had been mining the hills of the Ajo area for centuries to obtain hematite. In the late 1870s, mining camps in the Ajo, Quijotoa, and Gunsight communities in western Pima County transported materials, supplies, and workers to Tucson via dirt roads and a rail line across what is now the Tohono O'odham Reservation. Today that route (Ajo Highway) is the main travel corridor between eastern and western Pima County.

The Greaterville mining district on the east side of the Santa Rita Mountains was known for placer mining (e.g., panning for gold). In the center of the placers was the village of Greaterville. By 1881, much of the mining operations had stopped here and by the early 1900s most of the placer mines in Pima County were no longer operational. Numerous mining communities formed during boom times became ghost towns.

National and international demand for metals increased during World Wars I and II, sparking activity at Helvetia, Rosemont, Silver Bell, Twin Buttes, and other mines. In 1916, the water supply at Ajo was developed, and large-scale production of copper began there. Since that time, the Ajo mine has closed and reopened at different times. Copper mining activity fluctuated according to increases and declines in prices. New extractive processes have extended the viability of mines. Advanced technology is typically more cost effective when copper prices are high.

Non-fuel industrial minerals produced within Pima County include sand and gravel, crushed stone, clay, cement, gypsum, lime, limestone/marble, decorative rock, and clay.

Over 7 million tons of sand and gravel are produced in the Tucson area annually. Coal and natural gas are not currently known to occur in Pima County. Two areas of untapped geothermal potential exist within Pima County; the Avra Valley and Tucson Basin are known to have geothermal water resources.

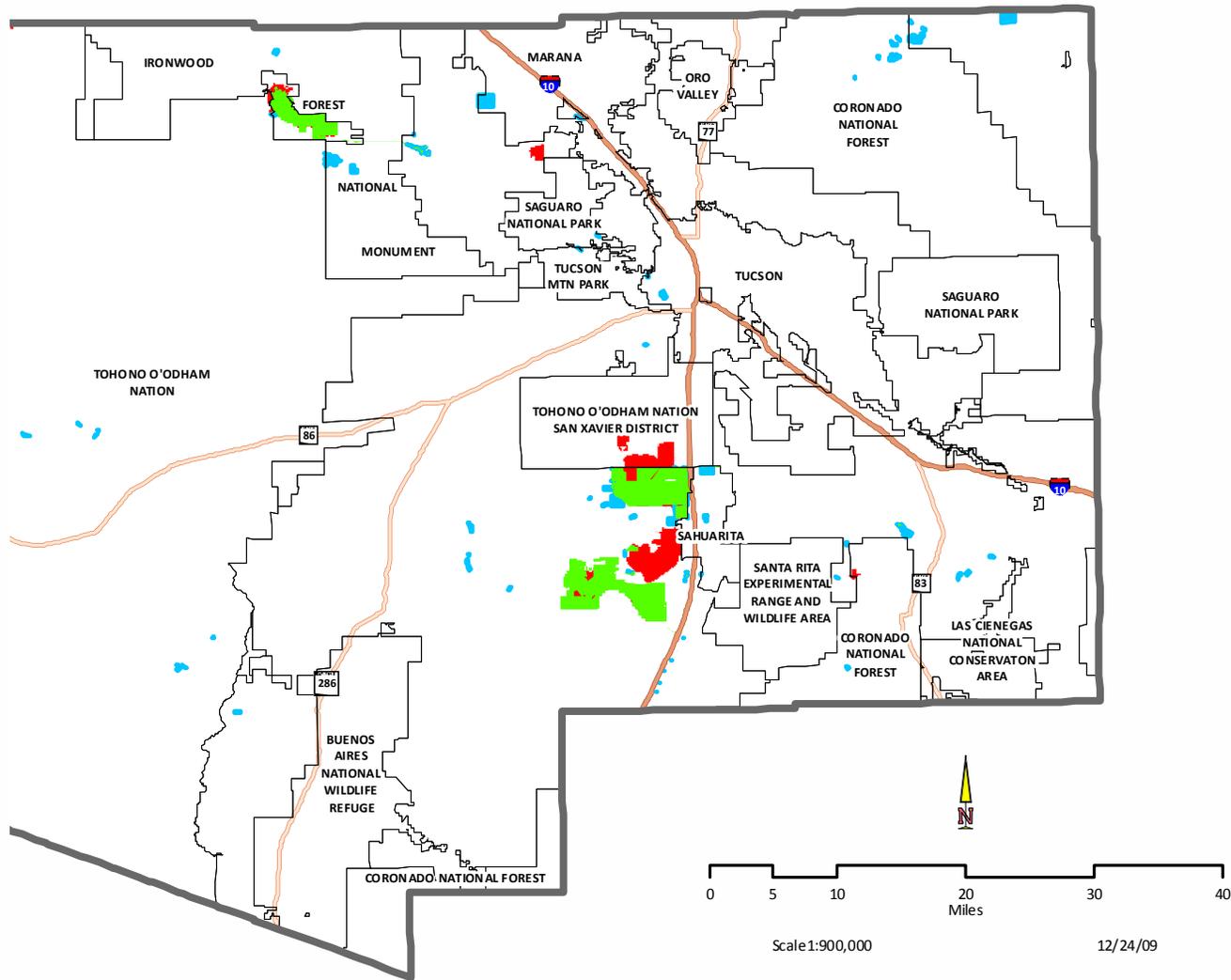
Approximately 53,000 acres in Pima County has been mined (Figure 3.18), including active and inactive mines, such as abandoned, unreclaimed waste piles and tailings, as well as lands owned by the mines for water extraction or mineral processing. Currently the most prominent mining companies in operation in Pima County are Freeport-McMoRan and the American Smelting and Refining Company. The Freeport-McMoRan Sierrita, Inc. Mine, six miles northwest of Green Valley, produces copper, rhenium, and molybdenum. The American Smelting and Refining Company currently operates the Silver Bell Mine, 40 miles northwest of Tucson, and the Mission Complex Mine in Sahuarita, Arizona. There is currently one active limestone operation in the Santa Rita Mountains, where there are large reserves of recrystallized limestone.

3.12.2 Existing Mineral Districts

Mineral districts delineate the extent of known mineralization as indicated by the presence of mines and prospects. Figure 3.19 shows mineral districts in Pima County and identifies principal commodity products within each district. In terms of total rock processed, the three largest districts with active mines are Pima, Silver Bell, and Ajo, all with major porphyry copper deposits. The mapped boundaries of the districts have been adjusted to match the known distribution of mines and prospects and to conform to the distribution of mineralized rock units. Mine and prospect locations are from the U.S. Geological Survey Mineral Resource Data System database, the U.S. Bureau of Mines Mineral Industry Locator system (now maintained by U.S. Geological Survey), and a coverage of digitized mine shaft and tunnel locations obtained from Pima County Department of Transportation.

The mineral district boundaries have been placed to exclude thick deposits of rock that cover potentially mineralized rock, or the boundaries are drawn to enclose the major concentration of mines and prospects within rock that is favorable for mineral deposits. Many mineral districts at the edges of mountain ranges extend for unknown distances beneath shallow alluvium on pediments bounding adjacent basins. In general, district boundaries have not been extrapolated beneath basins.

The depth to bedrock contours on Figure 3.20 provides a qualitative indication of the zones of relatively thin alluvium adjacent to mountain ranges that may cover economically viable mineral deposits. Where a mineral district borders a pediment area adjacent to a mountain range, the mineralization may extend under the alluvial cover. The distribution of Quaternary fluvial deposits provides the quickest indication of likely sources of sand and gravel resources. The outcrop area of these deposits should be considered prospective for sand and gravel. A more in-depth evaluation of sand and



-  2009 Mine Land Use (Source: AZ Dept. of Revenue use code)
-  Other Mine Land Use (Source: Southwest ReGAP analysis)
-  Other Mine Land Use (Source: Pima County records)
-  Administrative Boundary

Figure 3.18
Pima County Mining Land Use

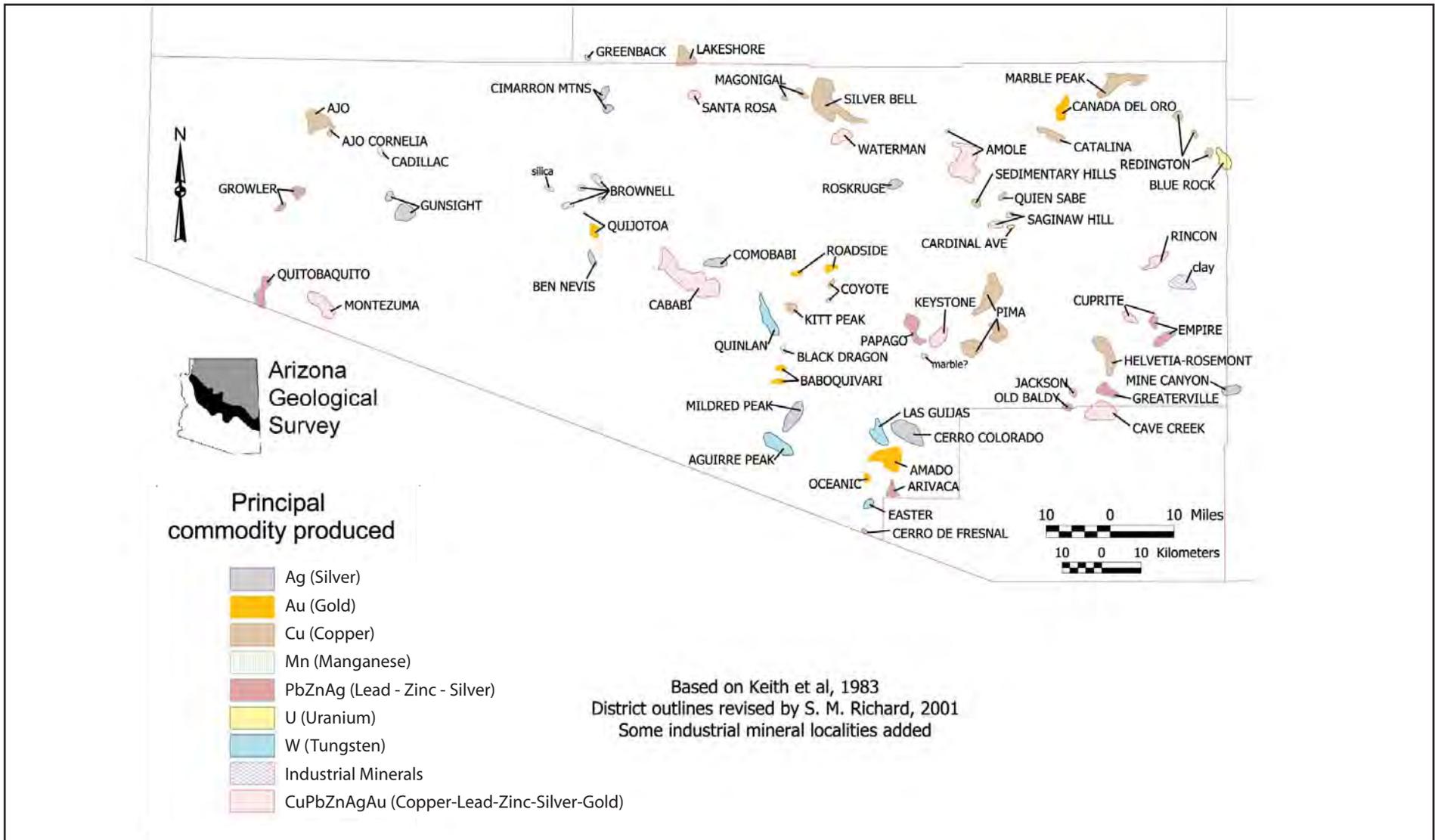


FIGURE 3.19
 Mineral Districts in Pima County

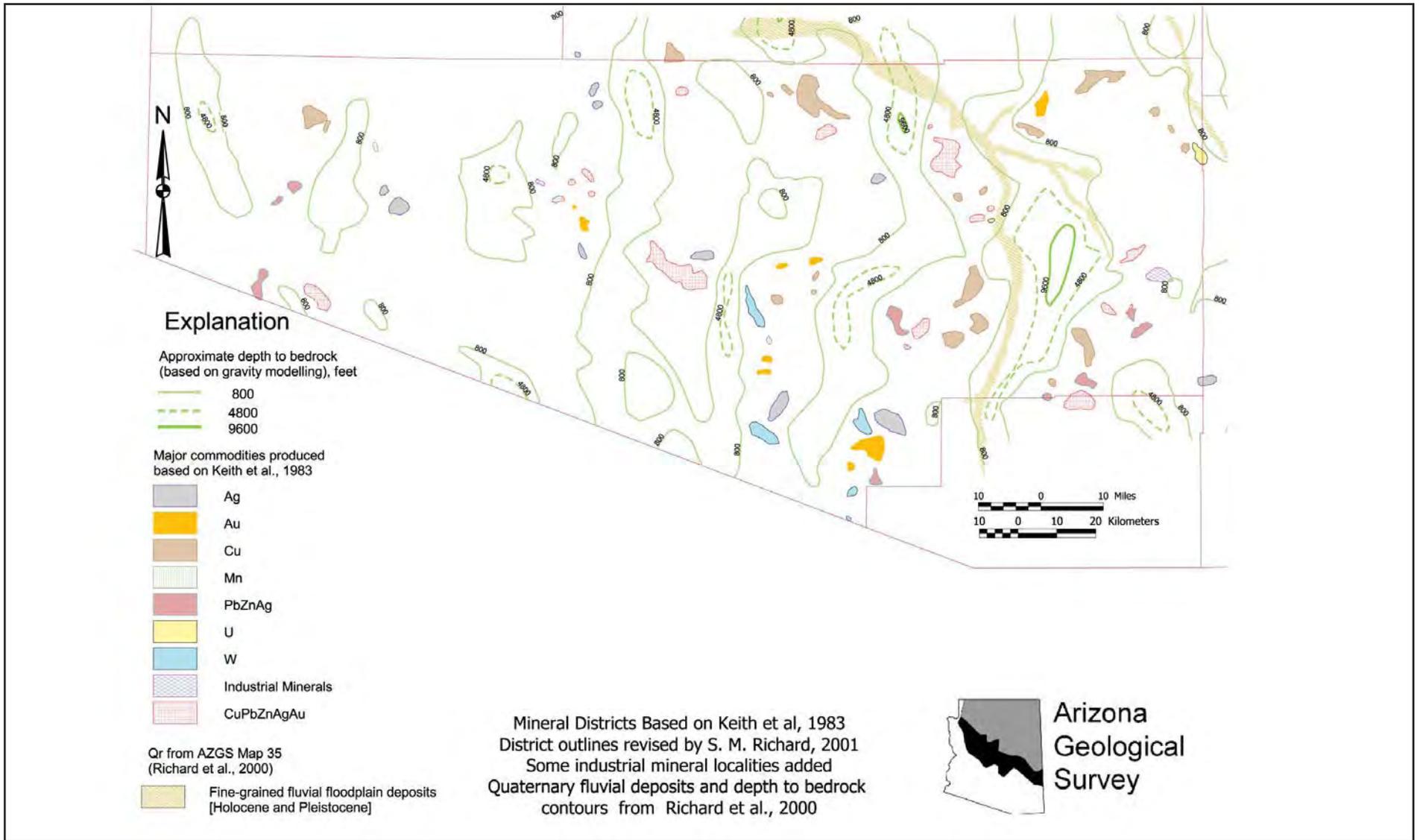


FIGURE 3.20
 Mineral Districts, Depth to Bedrock,
 and Quaternary Fluvial Deposits

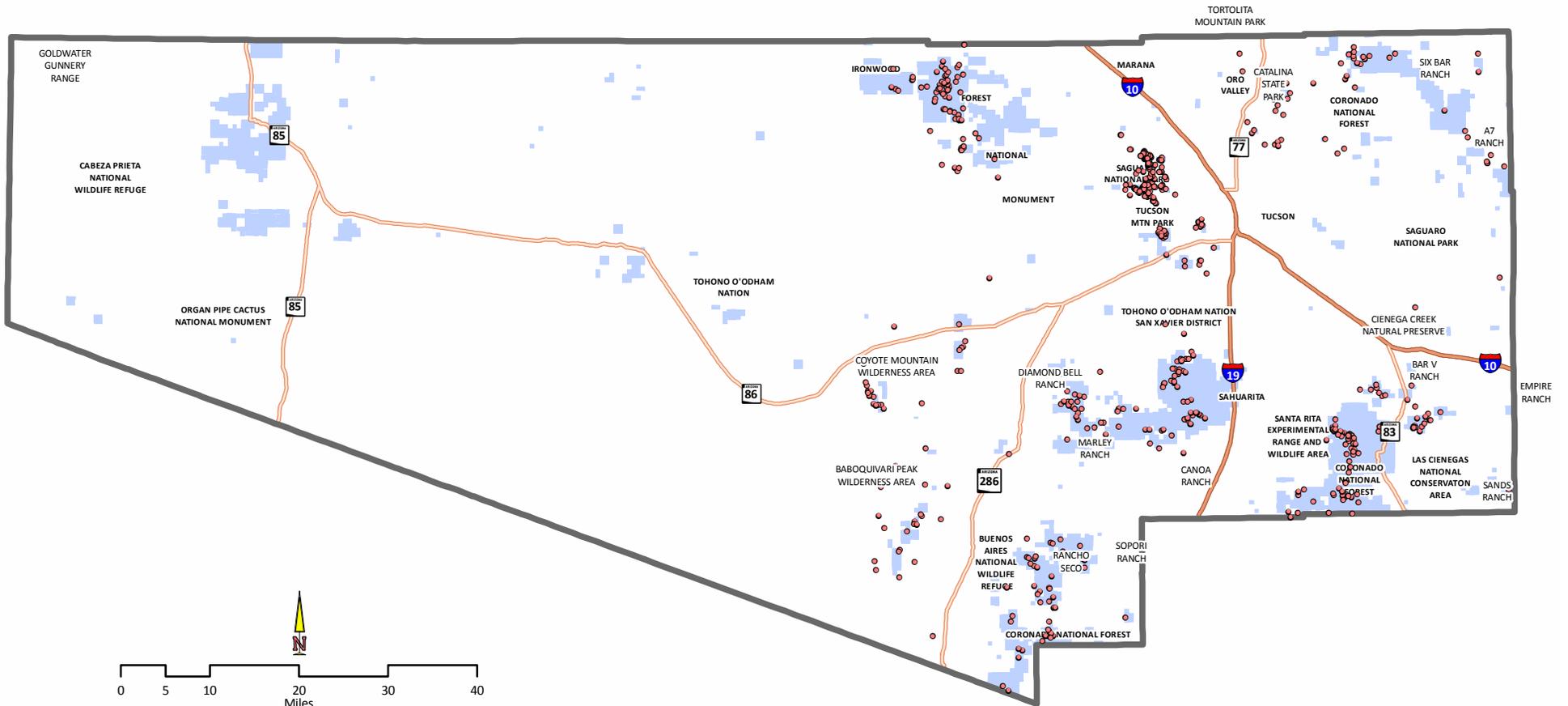
gravel resources would be required in order to show all other less-known unevaluated Quaternary deposits.

3.12.3 Potential for Further Development of Mineral Resources

The potential for further discovery and development of copper deposits and other mineral resources exists within Pima County. This is shown graphically in Figure 3.21, which displays mining claims administered through BLM, and metallic mineral prospects as identified by Southwestern Minerals Exploration Association (2001). Future mining is possible or likely at the following locations:

- Santa Rita and Whetstone Mountains. An undeveloped copper ore body exists at the historic Helvetia–Rosemont mining complex in the Santa Rita Mountains. A large mine is proposed for this area by Augusta Resources’ Rosemont Copper, which holds mining claims to over 12,000 acres of National Forest land. Further south is the Greaterville Mining District. These areas have medium to high mineral resource potential, as do other isolated areas at the north end of the Santa Rita Mountains and on the west side of the Whetstone Mountains.
- Buehman Canyon. Portions of Buehman Canyon, a tributary to the San Pedro and an CLS Important Riparian Area, are covered by mining claims. Activities here have included vegetation clearing and road cutting.
- Arivaca. There is a medium to high potential for mineral resources in the San Luis Mountains (see Figure 3.19), which form the upper southwestern watershed of Arivaca Creek. There has been extensive historic mining activity in this general area, at Las Guijas and Cerro Colorado. ADEQ water quality monitoring efforts have detected unsafe levels of mercury in fish tissue at nearby Arivaca Lake, which may be associated with past mining activities.
- Ajo. The potential for increased small-scale mining activities exists in the BLM-administered lands that surround Ajo, or renewed efforts at New Cornelia.
- Santa Catalina Mountains. The Oracle Ridge Mine is being proposed for reactivation.
- Green Valley. The potential exists for renewed mineral processing or disposal at Twin Buttes, and there is a proposed new tailings impoundment of 3,415 acres at the Sierrita mine.

Excavation of sand, gravel, and other aggregates from river channels is a commercial use that will continue to be important to growth and development. The demand for readily available aggregates for paving, building, and landscape materials results in the



- Metallic Mineral Prospect
- Mining Claim Area (BLM)

Figure 3.21
Potential for Future Development of Mineral Resources in Pima County

removal of large quantities of sand and gravel material from floodplain areas, many of which are important riparian areas.

3.12.4 Regulatory Context

3.12.4.1 Federal

The General Mining Law of 1872 is one of the primary forces behind the development of mineral resources in the West, along with the industries and services that supported mineral production. The law permits exploration and mining of all locatable minerals, such as gold, silver, and copper on public lands. This Federal law, with a few additions and amendments, provides the framework for mineral entry including the acquisition of title to mineral property by private owners by a process including the staking, recording, and performing of assessment work on claimed areas. The Mineral Leasing Act of 1920 enables the Federal government to act as lessor for bulk mineral commodities including coal, gas, sand, gravel, and clay, among others. The Mining and Mineral Policy Act of 1970 reinforces the Federal government's position to foster and encourage private enterprise in the development of economically sound and stable domestic mining.

Some basic principles of the Federal mining laws are that:

- mining is considered a private industry to be regulated and fostered as any other private industry;
- a grant or conveyance by the Federal government carries mineral rights unless specifically reserved;
- no royalties are reserved; and
- upon conveyance, mining land becomes private property subject to the same rules of law as other real property.

There are existing laws that restrict mineral exploration and discovery on certain public lands. One example is the Wilderness Act and related Executive Orders that restrict mineral exploration and discovery in the Pusch Ridge, Mt. Wrightson, and Coyote Mountains Wilderness areas. In addition, numerous environmental laws such as the Clean Water Act of 1977, the NHPA, and the ESA can limit or influence mining activities. Several specific public laws prevent new mineral claims in metropolitan Tucson and the military reservations at DMAFB and the Goldwater Range.

Currently, all Federal land mining claims are recorded with the BLM, although only mining operations that occur on BLM and Tribal lands are regulated by the BLM. The USFS regulates mining operations on USFS land. Wilderness, national monuments, national wildlife refuges and national conservation areas are closed to mineral entry, therefore, no new exploration activity or claim filing is permitted for these designated

lands. Other Federal lands are open to mineral entry given current laws. There are no provisions made in Federal law for the location of claims on privately owned mineral estate, and mineral development thereon is a matter for private negotiation.

3.12.4.2 State

On lands conveyed to the State of Arizona with mineral rights retained by the Federal government, the process of recovering mineral commodities is similar to the process on federally regulated lands through the recording of a located mine claim with the BLM. The State then requires a special-use permit with rents and compensation for damages. Arizona State Trust lands with mineral rights intact are open to mineral leasing.

While Arizona mines are subject to relevant Federal laws, which regulate claims processes, it is State laws that regulate land lease agreements, access, and inspections. The State Land Commissioner oversees land lease agreements and claims' renewal processes for mining operations allowed on State lands. Access to mineral resources involves allowing surface area disturbance to the extent that seems necessary as approved by the State Land Commissioner. Ingress and egress are required from adjacent private and/or State lands regardless of land use on the adjacent lands.

The State Mine Inspector performs inspections at regular intervals. For active underground mines employing 50 or more persons, inspections occur at least once every three months, and for all other mines, at least once each year. Inspections review the operation, conditions, safety appliances, infrastructure, sanitation and ventilation, the means of ingress and egress, health and safety measures, the cause of accidents and deaths occurring at the mine, and the means taken to comply with the provisions of this title.

3.12.4.3 Pima County Comprehensive Plan

The Pima County Comprehensive Plan (2001) Update reflects that certain mining lands, including mines and aggregate extraction areas, are now designated on land use plan maps as resource extractive lands and are protected for their extractive capabilities and from encroachment by incompatible uses.

Pima County does not have authority over most mining activities, including most mining reclamation. Pima County also lacks authority over mineral entry and exploration of the state and federally reserved mineral estate, even on land owned in fee simple by Pima County. Pima County does have a very limited authority over aggregate mining

3.12.4.4 Pima County Code Requirements for Aggregate Mining

The Pima County RFCD issues permits for sand, gravel, and other excavations in floodplains under the Pima County Code, Chapter 16.24, Floodway Requirements. These Floodplain Use Permit requirements stipulate conditions to prevent the

obstruction of floodwaters, hazards to structures or property, adverse effects on groundwater recharge, and other protective measures.

Due to the dynamic hydraulic characteristics of watercourses in Pima County and the effects excavations have on these characteristics, floodplain use permits for excavations are only issued for a limited period, not to exceed one year, subject to annual renewal upon review by the County engineer.

Floodplain use permits for excavations may impose conditions regarding the area and location in which excavations are allowed, the maximum amount of material to be excavated, and other reasonable restraints on the methods of operation. Recent changes to the code have added a requirement for a reclamation plan to be provided for all extraction operation permits. The reclamation plan must show in sufficient detail the actions that are proposed to reclaim the excavated areas so that all adverse effects of extraction are mitigated. The plan is also required to contain a timetable and financial assurances for accomplishing successful reclamation.

Chapters 18.13, Rural Homestead Zone, and 18.12, Institutional Reserve Zone, of the Pima County Zoning Code, allow sand and gravel operations and, under certain conditions, asphalt and cement plants.

3.12.5 Economic Role of Mining

In the past, Pima County's economy and development relied heavily on mining, especially copper mining. During the height of mining activity (during the last quarter century), the full net value of mines (1980–1981) was 4.8 percent of the total value of taxable property. Currently it is estimated to be 0.5 percent. The full net value on a per-capita, constant-dollar basis fell 87 percent from 1980-81 to the present.

Although the influence and former stature of mining in southern Arizona was great, the mining industry is no longer a major force in Pima County's diverse economy. According to the Arizona Department of Commerce, mining is not considered to be a major industrial cluster for the County. Currently, the single largest economic sector is in services, with mining accounting for less than 0.5 percent of the County's employment in 2007. In 2007, mining employed approximately 2,194 persons (U.S. Census Bureau 2007).

3.13 Socioeconomics

This section presents information with respect to Pima County's social and economic resources. A description of the population characteristics, the local economy, significance of eco-tourism, housing trends, and future projections is provided below.

3.13.1 Demographics

3.13.1.1 Population

Pima County is a large and rapidly growing County with a population of approximately 1 million. Over 500,000 people live in Tucson, which is the County seat and home to the University of Arizona. Population growth between 1970 and 2010 is reflected in Table 3.9. The 2010 Census data for Pima County population is 980,263. Pima County's population is expected to reach 1.45 million by 2041.

**TABLE 3.9
POPULATION OF TUCSON AND PIMA
COUNTY 1970–2010**

Year	Tucson	Pima County
1970	262,933	351,666
1980	330,537	531,433
1985	376,195	611,471
1990	405,390	666,880
2000	486,699	843,746
2010	520,116	980,263

Source: Arizona Department of Commerce 2009 and
PAG 2013

3.13.1.2 Migration

There is a relatively high level of migration in and out of Pima County. The long-term ratio of in- to out-migrations is estimated to range between 4:3 and 3:2 (U.S. Census Bureau 2013). The highest number of in-migrants come from Phoenix and Los Angeles. Persons leaving Tucson and Pima County most often move to Phoenix and the surrounding counties of Pinal, Cochise, and Santa Cruz. This constant change in demographics can affect community decision-making, particularly when long-term positive benefits require short-term investment by citizens who will have moved on before receiving such benefits.

3.13.1.3 Age and Ethnicity

The median age of residents was estimated to be 37.7 in 2010. Originally home to only Native Americans, the population mix of this area has since been heavily influenced by Spanish explorers and the fact that the area was part of Mexico until the Gadsden Purchase of 1854. Current ethnic diversity is reflected in Table 3.10.

TABLE 3.10
ETHNIC DIVERSITY OF PIMA COUNTY'S POPULATION

Percentage of Population	Ethnic/Racial Representation
57.4	White, Non-Hispanic
30.1	Hispanic
4.5	Black/African American
5.2	Native American
3.0	Asian
0.3	Native Hawaiian or Pacific Islander
0.1	Other (self-identified)
2.5	Two or more races

Source: U.S Census Bureau 2011: State and County QuickFacts: Pima County, Arizona

3.13.2 Economy

3.13.2.1 Employment

Pima County's economy of the mid-1900s was a reflection of "Arizona's five Cs": copper, cattle, cotton, citrus, and climate. Climate, as related to tourism, has remained strong. The other four Cs continue to contribute to the economy, but other areas of the economy are now prominent. The April 2013 occupational employment data for Tucson area employment, by sector and the percent of change from 2009 are shown in Table 3.11.

TABLE 3.11
TUCSON METROPOLITAN AREA EMPLOYMENT BY SECTOR

Sector	2009*	2013*	Change 2009/2013 (percent)
Nonfarm Employment	351.5	368.4	4.8
Manufacturing	24.9	23.1	-7.2
Natural Resources and Mining	1.6	2.1	31.3
Construction	11.8	14.3	21.2
Leisure and Hospitality	37.4	42.9	14.7
Trade, Transportation, and Utilities	56.6	57.9	2.3
Professional and Business Services	42.3	N/A	N/A
Information	4.4	4.0	-9.1
Government	78.7	81.7	3.8

Source: Economic and Business Research Center, University of Arizona 2013

*Thousands

3.13.2.2 Tourism: Environmentally Based Economic Sector

Southern Arizona has long been a tourist destination. The mild climate, particularly the warm winters, attract visitors to Pima County from all over the world. The relatively warm and sunny winter climate is a principal attraction for residents, visitors, and businesses, and, therefore, has a direct and positive impact on the local economy. The importance of

climate-dependent tourism and outdoor recreation as significant economic sectors continues to grow.

Scenic quality, varied terrain, the unique Sonoran Desert vegetation, birds and wildlife, cultural resources, proximity to Mexico, and recreational opportunities contribute to this attraction. Natural and cultural resource-based tourism is becoming more and more popular. Tucson is the primary jumping-off point for southern Arizona's eco-tourism industry (used here to broadly include the visitation of natural areas). Researchers from the University of Arizona have estimated that nearly half of visitors to this area visit some type of park or natural area.

The top 10 most popular tourist attractions in the Tucson vicinity are shown in Table 3.12. Other outdoor recreation resource areas are described in Section 3.11, Recreation, and in Section 3.11.5, Stewardship of Recreation Resource Areas.

**TABLE 3.12
SOUTHERN ARIZONA'S TOP TOURIST ATTRACTIONS**

Attraction	Annual Attendance (2008)	Description
Saguaro National Park	720,207	Saguaro cacti, Upper Sonoran Desert biota, hiking trails, visitor center
Arizona–Sonora Desert Museum	470,000	Zoological park, geological museum, botanical garden
Reid Park Zoo	467,108	17-acre zoo, animals in natural settings, gift shop
Tohono Chul Park	342,774	Sonoran Desert plants, culture, lectures, nature trails, nursery, bird watching, shops, tearoom
Pima County Fairgrounds	240,000	County fair, exhibits, 4-H, concerts, carnival rides
Old Tucson Studios	196,000	Family theme park, movie location, live entertainment
Mt. Lemmon Ski Valley	188,000	Restaurant, shops, hiking, skiing, lifts
Tucson Museum of Art and Historic Block	181,852	Historic district, museum, art museum
Patagonia Lake State Park ^a	202,785	Recreation lake, camping, wildlife viewing
Kartchner Caverns State Park ^a	198,374	Natural cave formations, gift shop, camping

^aNot located in Pima County, but Tucson is the origination point.

Source: Arizona Office of Tourism 2008

According to the City of Tucson Economic Update (2004), tourism accounts for one of every 10 jobs and adds over \$1.8 billion per year to the local economy. Travel and tourism produce 40,000 jobs in all of the sectors listed in the Employment section above; and tourism has been one of the most rapidly growing industries in Tucson.

3.13.2.3 Income

In 2011, Pima County's per capita personal income was \$25,477, which is 91 percent of the national average of \$27,915. The median household income in 2011 was \$46,341, only 88 percent of the national average of \$52,762 (U.S. Census Bureau 2011). Personal income and earnings by industry for Pima County are shown in Table 3.13.

**TABLE 3.13
PERSONAL INCOME AND EARNINGS BY INDUSTRY**

Description	Pima County (Earning in millions of dollars)	Percent of Statewide
Personal income	34,516,424	15.76%
Population (persons)	1,020,200	15.47%
Per capita personal income (dollars)	33,833	101.89%
Earnings by industry		
Farm earnings	15,981	3.18%
Nonfarm earnings	21,266,072	14.06%
Private earnings	15,834,924	12.91%
Forestry, fishing, and related activities	7,167	1.71%
Mining	173,005	14.47%
Utilities	219,258	13.91%
Construction	1,018,904	10.98%
Manufacturing	2,449,708	19.27%
Wholesale trade	550,687	6.83%
Retail trade	1,423,329	12.28%
Transportation and warehousing	431,377	9.19%
Information	377,189	12.40%
Finance and insurance	674,009	7.02%
Real estate and rental and leasing	370,638	9.29%
Professional, scientific, and technical services	1,952,184	15.34%
Management of companies and enterprises	174,536	7.60%
Administrative and waste management services	925,056	10.94%
Educational services	185,100	8.20%
Health care and social assistance	3,140,096	17.26%
Arts, entertainment, and recreation	161,199	9.39%
Accommodation and food services	768,671	13.86%
Other services, except public administration	832,811	15.73%
Government and government enterprises	5,431,148	19.02%
Federal, civilian	1,204,116	22.04%
Military	701,011	26.11%
State and local	3,526,021	17.27%
State government	1,316,469	27.70%
Local government	2,209,552	14.11%

Source: Arizona Department of Administration, Office of Employment and Population Statistics (2001-2009).

3.13.2.4 Housing & Affordability

In Pima County, housing costs are in an affordable range in most areas for an average earning household. In most areas, a median household could expect to spend 30 percent or less of their monthly income on housing (Center for Neighborhood Technology 2009). The cost of purchasing a home increased slightly in 2013 (as compared to 2012) due to rising prices and a recent increase in mortgage rates. However, homes remain affordable when compared to historic levels. Mortgage rates have steadily declined since 2008 and current rates are near historic lows (4.5 percent), which has helped make homes more affordable. Monthly mortgage payments have decreased from an average of \$1,377.34 per month for a median priced home (\$216,000) in 2006 to \$744.56 per month for a median priced home in 2013 (\$161,000) (Long Realty 2013).

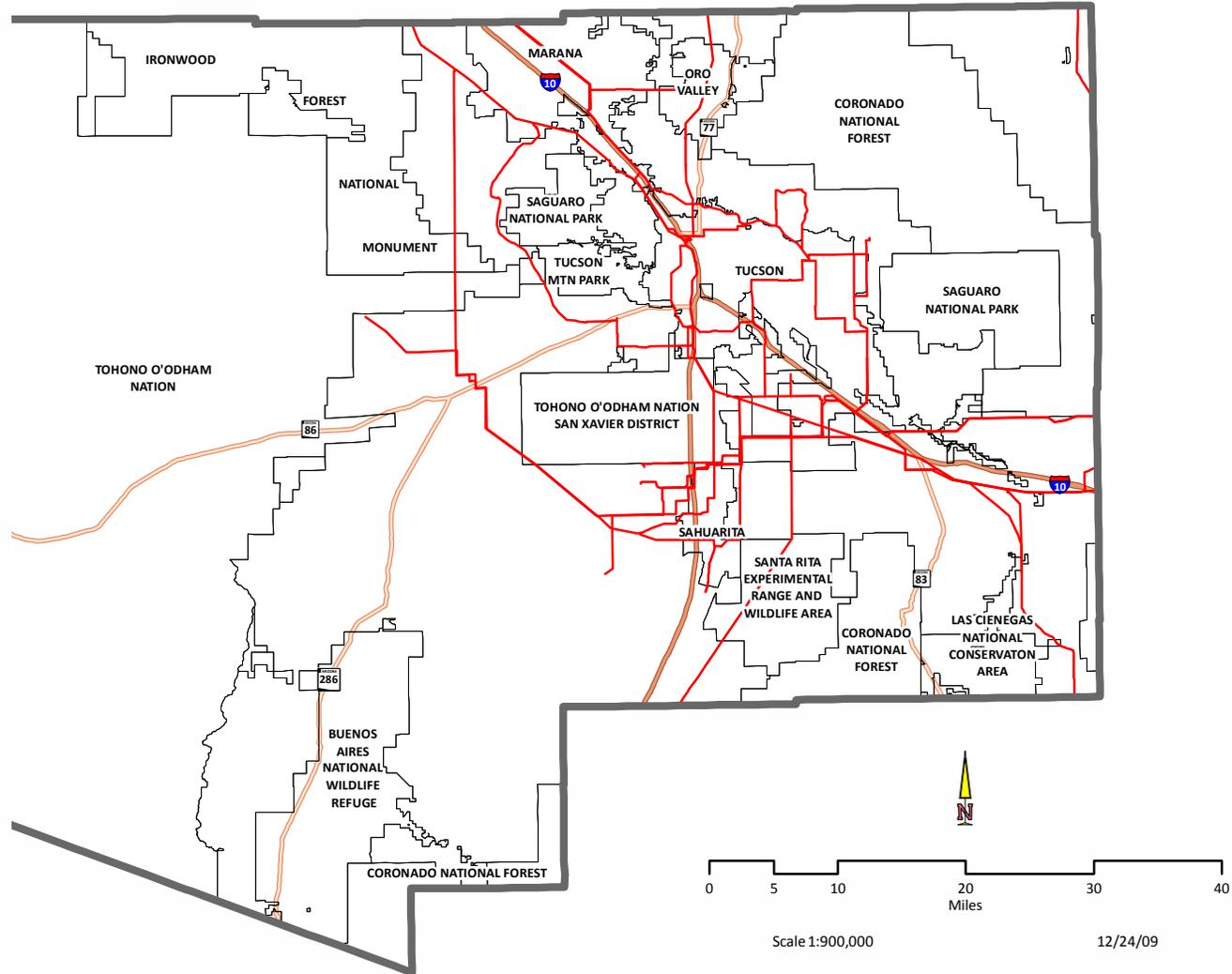
According to U.S. Census data, between 2007 and 2011, owners formed 64 percent of all Pima County households, and the median value of all owner-occupied homes was \$190,500. The number of building permits has decreased since 2005, from nearly 5,000 to around 2,800 in 2012 (U.S. Census 2013).

3.13.3 Community Services

Pima County community services include the provision of infrastructure such as streets, sewers, and wastewater treatment; public facilities such as libraries and parks; public safety and justice services as provided by the Sheriff's Department and the County judicial system; and public health care services. Funding for these services comes from the County's tax base. The costs of providing community services to unregulated lot-splitting areas described above are not matched or offset by taxes generated by these areas. Rather, it often costs more to provide services to these areas outside of the urbanizing area due to distance and increased needs.

3.14 Utility Rights-of-way

This section discusses utility rights-of-way within Pima County, as well as the characteristics of utility and utility rights-of-way. The discussion also includes proposed utilities. Linear utility lines/rights-of-way serve a necessary public function (providing infrastructure), but can significantly contribute to landscape fragmentation. As a result, current right-of-way locations and future planning are relevant as they involve public interest, future growth needs, and financial considerations. Major electrical transmission lines located within Pima County are shown in Figure 3.22.



 Existing Transmission Corridor

 Administrative Boundary

Figure 3.22
Existing Transmission Corridors

3.14.1 Pima County Regulatory Context

3.14.1.1 Utility and Utility Rights-of-way Characteristics

Pima County authorizes use of County lands as rights-of-way for a variety of utilities, including electric, gas, water, and forms of telecommunications such as telephone, fiber optics, cellular, and cable. Utilities need rights-of-way for lines, pipes, plants, and substations in order to produce, transmit, and provide the public with a particular service. These rights-of-way may occur in the form of an encroachment in public rights-of-way or road rights-of-way, or may be an easement through a property or several properties. These encroachments or easements may be for aerial, surface, subsurface utilities, or a combination thereof. Utilities differ in how they are regulated, if at all, and in their power to acquire or encroach upon the land for which they need rights-of-way. As stated under Title 12 of the ARS, public agencies and utility companies have the ability to acquire land through the power of condemnation for electric, power, and gas lines, and all transportation, transmission, and intercommunication facilities of public service agencies

3.14.1.2 Arizona Corporation Commission

For power plants (of 100 megawatts or more) or transmission projects (of 115,000 volts or more), regulatory authority lies with the Arizona Corporation Commission, which oversees the electric power industry in Arizona. The Arizona Corporation Commission's Power Plant and Transmission Line Siting Committee evaluates applications to build power plants in the state and grants or denies a Certificate of Environmental Compatibility, which is a formal document that is necessary before the power plant or transmission line can be built.

3.14.1.3 Pima County Agreements with Utility Companies

Pima County regulates all utility companies that locate their facilities within County rights-of-way through the use of utility license agreements. While Federal and State laws govern the rights of the different utility companies operating within the state, the County's utility license agreements control the manner in which utility providers locate their facilities in the public rights-of-way and specify when relocation is necessary to accommodate the County's use of its rights-of-way. The exception to this rule is when a utility company can demonstrate that their facilities predate the County right-of-way. Another exception to the rule is the City/County Intergovernmental Agreement that authorizes the City of Tucson's water facilities to use all County rights-of-way in exchange for the County's right to locate its sewer facilities in City rights-of-way.

Pima County land development is guided by policies of the Pima County Comprehensive Plan, implemented by the County Zoning Code within unincorporated areas. The BOS incorporated the SDCP into the Pima County Comprehensive Plan on December 18, 2001, in accordance with the requirements of the Growing Smarter Plus legislation. In

addition, Pima County's Development Services Department has a BOS-approved Procedures Requirement Book, which requires all new and existing easements to be shown on subdivision plats and development plans. Utility companies review the plats and plans and have the right to require these easements at the time of platting or development. All jurisdictions have zoning requirements that may affect placement of utilities.

3.14.1.4 Utility Rights-of-way on Pima County-owned Land

While Pima County may actually own the land on which a utility right-of-way may be requested, Pima County may not always be able to provide an easement for a particular use. It depends on how the property was acquired. If the County acquired property from the Federal or State government, certain rights may have been reserved. For example, several of Pima County's parks were acquired from the BLM under a Recreation and Public Purposes permit, which restricts uses that the County can allow on the property. As a result, if a utility company requested an easement through these park lands, the utility may have to get prior permission from the BLM, not the County. Each case is evaluated individually, and the full title history of the property is reviewed, whether the request is for a new easement or an encroachment into an existing right-of-way.

If the County owns the land with no reservations, it can sell or lease land, or convey certain rights under Title 11 of the ARS. The County negotiates requirements for rights-of-way with each utility. A value for the easement is determined through a County appraisal. The appraised value, along with the project plans, is reviewed by staff and goes before the BOS for approval.

3.14.2 Proposed Regional Utility Projects

Several new major transmission line projects are being proposed in eastern Pima County. One proposal, the SunZia project, would potentially cross A7 Ranch and Bingham Cienega Natural Preserve, located in the San Pedro River valley. Other transmission line proposals include:

- Rosemont 138 kilovolt (kV) Transmission Line Project: Tucson Electric Power Company (TEP) is in the preliminary stages of planning for the construction and operation of new electrical transmission facilities to serve the proposed Rosemont Copper mine in the Santa Rita Mountains southeast of Tucson. (A new water supply line for the proposed mine is also under consideration. Proposed alignments for the power and water supply do not cross County preserves, but would cross the CLS.)
- Saguaro Substation to North Loop Substation Transmission Line Project: TEP and Southwest Transmission Cooperative, Inc. propose to construct three 138 kV transmission lines to serve TEP customers, and one 115 kV transmission line to serve Southwest Transmission Cooperative's member service areas and the

proposed Adonis Substation. Proposed alignment segments in Pima County are east of Interstate 10, north of Avra Valley Road.

- Sahuarita–Nogales Transmission Line: TEP and its sister company, UniSource Energy Services, have proposed building a new 345 kV transmission line from TEP's South Substation in Sahuarita to a proposed UniSource Energy Services substation near Nogales, Arizona. Proposed alignment segments in Pima County are west of Interstate 19 and east of the Sierrita Mountains.
- Vail Area 138 kV System Project: TEP is planning to construct approximately 9 miles of 138 kV transmission line southeast of Vail. This proposal includes two new 138 kV substations near Cienega Creek and Marsh Station Road.

These proposed projects cross CLS areas of biological significance: biological core area, important riparian areas, and multiple use areas. Their approval or denial lies with the Arizona Corporation Commission, the Department of Energy, and Federal land management agencies (e.g., USFS, BLM).

3.14.3 Conservation Planning Context

The MSCP proposes to protect, in perpetuity, fee-owned mitigation lands through conservation easements. However, conservation easements cannot guarantee that all land areas within them will be protected from future utility rights-of-way, because certain public agencies and utilities may, under some circumstances, use their power of condemnation to approve, or gain approval for siting a utility right-of-way on lands intended for conservation. Provisions have been made in the MSCP for Pima County to replace the acreage and species habitat value of fee-owned mitigation lands that may be lost to utility rights-of-way. Issuance of a Section 10(a)(1)(B) permit by USFWS confers no additional regulatory authority to prevent the State or Federal entities from granting new utility easements across their lands.

3.15 Wildland Fire Management

This section provides an overview of wildland fire issues and discusses fire management within Pima County. The information included in this section is based on reports and sources listed in Chapter 8.

3.15.1 Overview

Pima County's present growth and development patterns have extended into and fragmented natural open space areas. This growth pattern poses a challenge to Pima County related to fire management efforts since the ability to implement fire strategies on large landscapes has become increasingly limited, and the risk to urbanizing areas has become increasingly greater. Residential areas in fire-prone urbanized zones require

fire-fighting tactics that are distinct from natural open space areas; human life and property are high priorities and overshadow strategies related to open space and wildland firefighting. Pima County's growing human population has led to an increased demand for land, particularly at the urban/suburban fringe, or the wildland/urban interface. The term wildland/urban interface describes the area or zone where structures and other human development meet and intermingle with the undeveloped natural wildland ecosystems and potentially dangerous, combustible vegetative fuel loads.

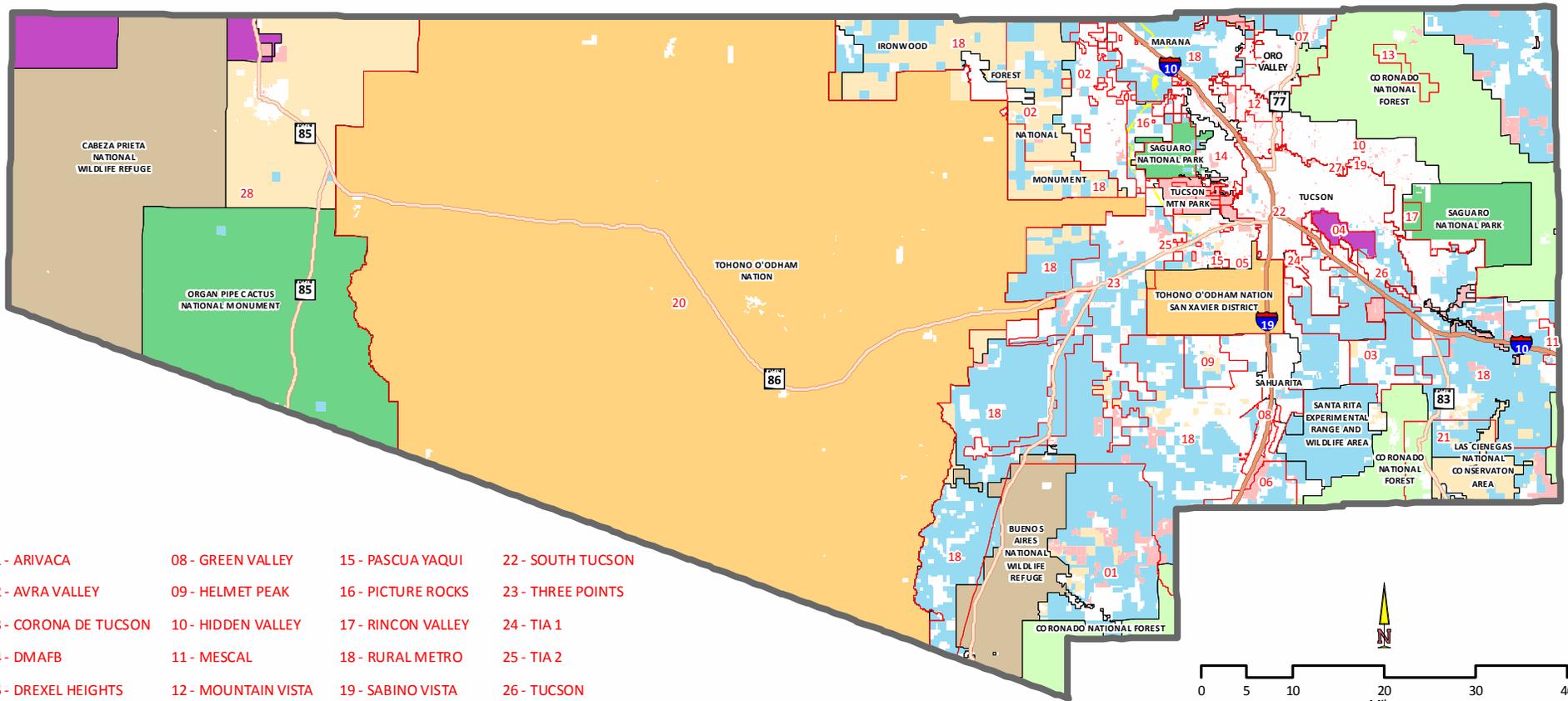
The invasion of non-native grass species throughout Pima County has introduced fire into plant communities that are easily damaged by, and do not often recover from fire damage. (See previous discussion in Section 3.3, Biological Resources, Invasive Species.) At higher elevations, the combination of fuel-load build-up, prolonged drought, human factors, and other circumstances has increasingly resulted in catastrophic wild fires such as those experienced in the last few years throughout the Southwest. In Pima County, the 2003 Aspen Fire burned 85,000 acres in the Catalina Mountains during weeks of fire-fighting in very rugged terrain during the hottest, driest part of summer. The community of Summerhaven and several residential areas adjacent to Coronado National Forest were evacuated, and many residences and businesses in Summerhaven were destroyed.

Fire management agencies seek to strike a balance between the protection of life and property, and the appropriate management of natural resources. Efforts to achieve both are not always successful. The use of practices such as prescribed burns, prescribed natural fires, and cooperative preplanned areas along with the interagency incident command system, are just a few methods used to reduce the hazard and risk associated with wildland fires.

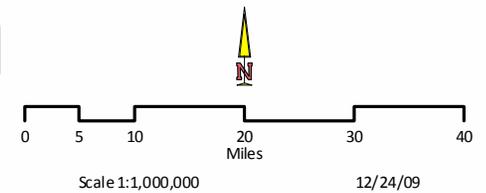
A cooperative effort among all fire protection management agencies helps to secure overall wildland fire management success, because of complex patterns of land ownership, fuel, weather, topography, and fire occurrence. Numerous agencies (Federal, State, County, and private) have jurisdictional authority and/or responsibility for wildland fire management. These are shown on Figures 3.23 through 3.25 and described briefly below.

3.15.2 Fire Management Jurisdiction

While many regional and local fire districts and departments in Pima County have both structural and wildland fire protection capabilities, their jurisdictions do not cover all of the landscape that is vulnerable to fire. Wildland fires that occur in a wildland/urban interface area and inside a fire district are easier to manage, in spite of probable structural protection challenges, than those that occur outside a given fire district's jurisdictional boundary. Outside a fire district's boundary, the responsibility generally falls



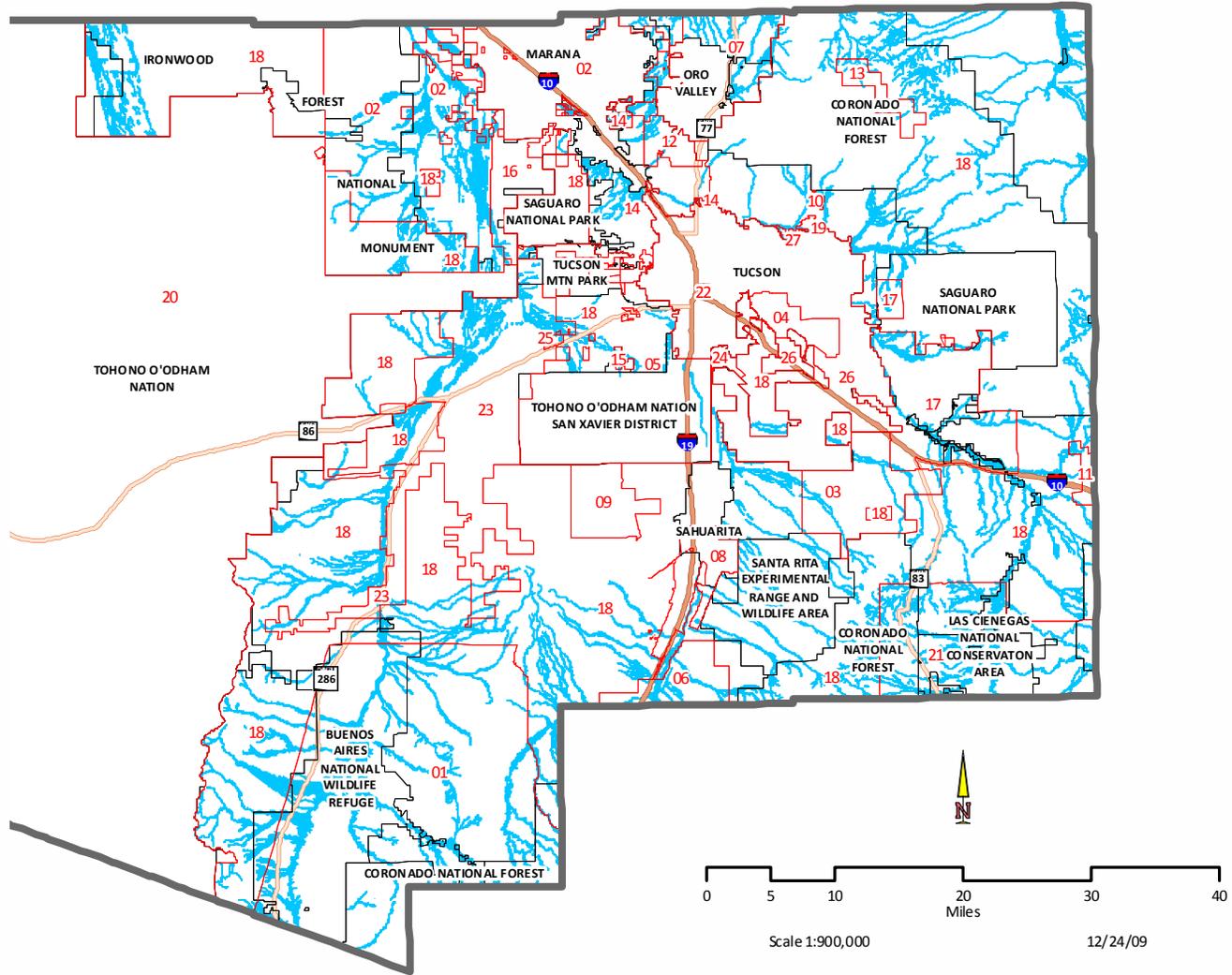
- | | | | |
|-----------------------|---------------------|--------------------|-------------------|
| 01 - ARIVACA | 08 - GREEN VALLEY | 15 - PASCUA YAQUI | 22 - SOUTH TUCSON |
| 02 - AVRA VALLEY | 09 - HELMET PEAK | 16 - PICTURE ROCKS | 23 - THREE POINTS |
| 03 - CORONA DE TUCSON | 10 - HIDDEN VALLEY | 17 - RINCON VALLEY | 24 - TIA 1 |
| 04 - DMAFB | 11 - MESCAL | 18 - RURAL METRO | 25 - TIA 2 |
| 05 - DREXEL HEIGHTS | 12 - MOUNTAIN VISTA | 19 - SABINO VISTA | 26 - TUCSON |
| 06 - ELEPHANT HEAD | 13 - MT. LEMMON | 20 - SELLS | 27 - TUCSON CC |
| 07 - GOLDER RANCH | 14 - NORTHWEST | 21 - SONOITA ELGIN | 28 - WHY |



- | | | | |
|----------------------------|---------------------------|-----------------------|------------------|
| Fire Service Area Boundary | Bureau of Reclamation | Forest Service | Private Land |
| Administrative Boundary | Dept. of Defense | National Park Service | State of Arizona |
| Bureau of Land Mgmt. | Fish and Wildlife Service | Pima County | Tribal Land |

Figure 3.23
Fire Service Areas

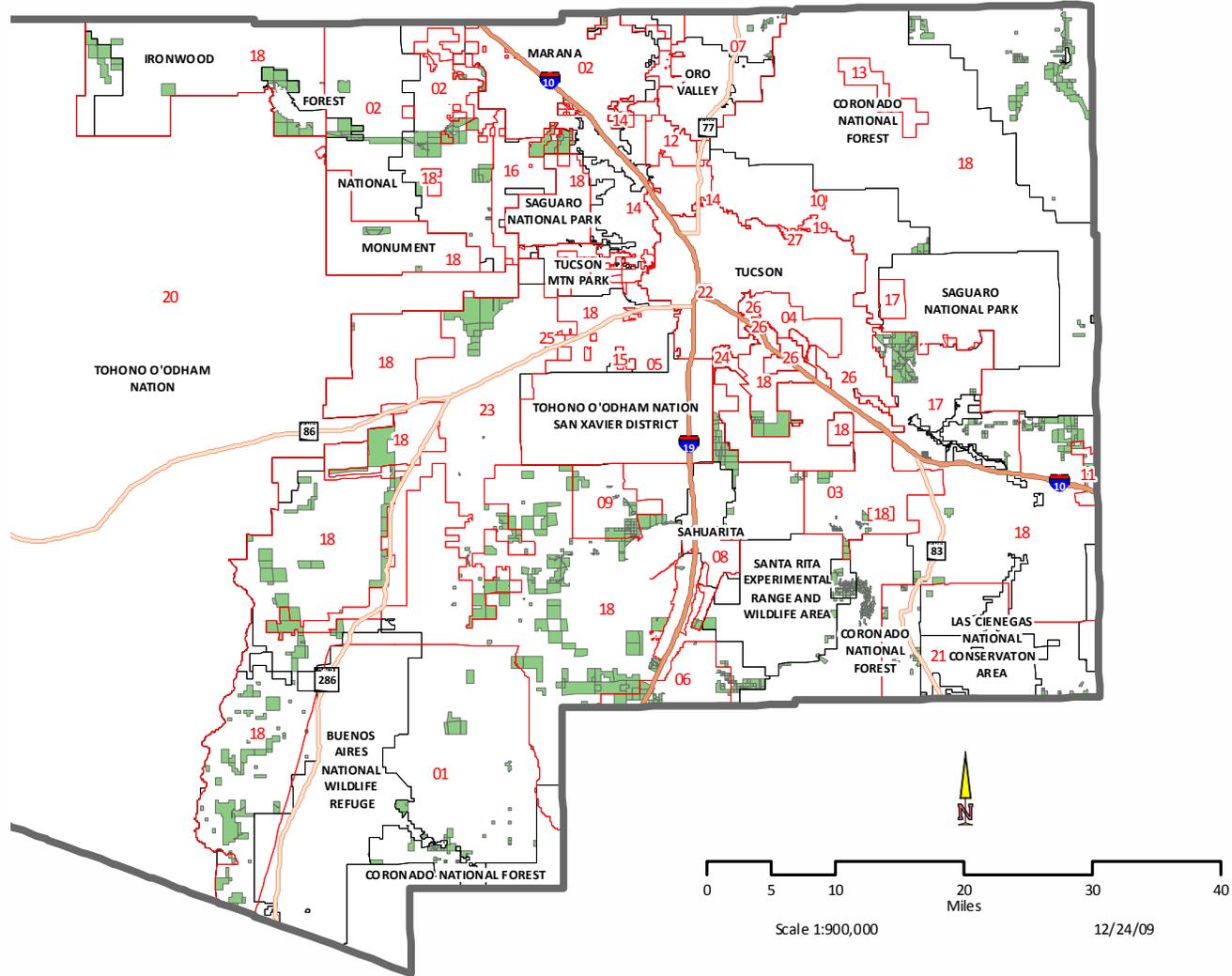
- 01 - ARIVACA
- 02 - AVRA VALLEY
- 03 - CORONA DE TUCSON
- 04 - DMAFB
- 05 - DREXEL HEIGHTS
- 06 - ELEPHANT HEAD
- 07 - GOLDER RANCH
- 08 - GREEN VALLEY
- 09 - HELMET PEAK
- 10 - HIDDEN VALLEY
- 11 - MESCAL
- 12 - MOUNTAIN VISTA
- 13 - MT. LEMMON
- 14 - NORTHWEST
- 15 - PASCUA YAQUI
- 16 - PICTURE ROCKS
- 17 - RINCON VALLEY
- 18 - RURAL METRO
- 19 - SABINO VISTA
- 20 - SELLS
- 21 - SONOITA ELGIN
- 22 - SOUTH TUCSON
- 23 - THREE POINTS
- 24 - TIA 1
- 25 - TIA 2
- 26 - TUCSON
- 27 - TUCSON CC



-  Important Riparian Areas
-  Fire Service Area Boundary
-  Administrative Boundary

Figure 3.24
Important Riparian Areas and Fire Management

- 01 - ARIVACA
- 02 - AVRA VALLEY
- 03 - CORONA DE TUCSON
- 04 - DMAFB
- 05 - DREXEL HEIGHTS
- 06 - ELEPHANT HEAD
- 07 - GOLDR RANCH
- 08 - GREEN VALLEY
- 09 - HELMET PEAK
- 10 - HIDDEN VALLEY
- 11 - MESCAL
- 12 - MOUNTAIN VISTA
- 13 - MT. LEMMON
- 14 - NORTHWEST
- 15 - PASCUA YAQUI
- 16 - PICTURE ROCKS
- 17 - RINCON VALLEY
- 18 - RURAL METRO
- 19 - SABINO VISTA
- 20 - SELLS
- 21 - SONOITA ELGIN
- 22 - SOUTH TUCSON
- 23 - THREE POINTS
- 24 - TIA 1
- 25 - TIA 2
- 26 - TUCSON
- 27 - TUCSON CC



-  Private Ranch Land
-  Administrative Boundary
-  Fire Service Area Boundary

Figure 3.25
Private Ranch Land and Fire Management

on Federal or State wildland fire-fighting agencies, whose responsibilities include the protection of structures and improvements. Structural protection can be done by Federal or State wildland fire-fighting agencies only under contract with regional or local fire districts and at great expense. In addition, structural protection automatically receives priority, while wildland fire-fighting planning, operations, and logistics are shifted to lower priority and become more complex.

3.15.2.1 Federal

Wildland fire jurisdiction is the authority and/or the responsibility of agencies, districts, and departments to respond to wildland fires and take the appropriate actions. Federal wildland fire organizations include the following:

- Department of Agriculture: USFS
- Department of the Interior: BLM, National Park Service, USFWS, and Tribal/Bureau of Indian Affairs

These agencies follow the current National Wildland Fire Policy, which requires that Federal wildland fire agencies take suppressive actions on all wildland fires that are a threat to Federal lands. Exceptions to this policy are valid only if approved wildland fire management plans are in place. Then, wildland fires can be managed using appropriate actions consistent with land and resource management objectives, safety, and cost-effectiveness considerations. Generally, Federal agencies carry out their policy using permanent and seasonal fire personnel and crews in addition to an array of contractual aviation resources.

3.15.2.2 State

The Arizona State government has one agency with wildland fire jurisdiction, the Fire Management Division of the Arizona State Land Department. According to Arizona law, this agency's jurisdiction includes all wildland fires on State and private lands outside of incorporated municipalities. It should be noted that County lands, State lands (including State Trust, State parks, and AZGFD lands), and private lands are included under the State's jurisdiction.

Much like the Federal wildland fire management policy, suppressive actions are required for all wildland fires, unless approved wildland fire management plans are in place to assist with the decision making process. The Fire Management Division of the Arizona State Land Department has a few permanent personnel that oversee the fire district's engine crews and the Department of Correction's hand crews. The agency also has a few contractual aviation resources.

3.15.2.3 Local and Private

City fire departments include those for the cities of Tucson and South Tucson. They provide structural and wildland fire protection, as well as medical and other emergency services within their respective city limits.

County fire districts and departments, which are formed by Arizona law, are funded in part through taxes and bonds. These fire districts and departments provide structural and wildland fire protection, as well as medical and other emergency services within their district boundaries. The following 16 fire districts and departments serve local jurisdictions with paid and volunteer personnel:

- Avra Valley
- Corona De Tucson
- Drexel Heights
- Golder Ranch
- Green Valley
- Heritage Hills – Rural Metro
- Hidden Valley – Rural Metro
- La Canada – Rural Metro
- Mount Lemmon
- North Ranch/Linda Vista – Rural Metro
- Northwest
- Picture Rocks
- Rincon Valley
- Sabino Vista – Rural Metro
- Three Points
- Tucson County Club Estates – Rural Metro

Private fire departments include both profit and non-profit organizations. Rural Metro Fire Department provides fire (structural and wildland) and medical services to six fire districts (Heritage Hills, Hidden Valley, La Cañada, North Ranch/Linda Vista, Sabino Vista, and Tucson Country Club Estates). It also provides services to other areas throughout Pima County through contractual agreements. Rural Metro Fire Department has wildland engines and hand crews available for fighting fires on a contractual basis. Six of the above 16 fire districts contract with the Rural Metro Fire Department.

Five non-profit fire departments operate in Pima County: Arivaca, Elephant Head, Helmet Peak, Mescal (also in Cochise County), and Sonoita–Elgin (also in Santa Cruz and Cochise counties). These fire departments provide wildland and structural fire

protection, as well as medical and other emergency services, relying mostly on volunteers.

3.16 Environmental Justice

This section identifies minority and low-income populations within the Permit Area that may be affected by implementation of any of the proposed actions. Demographic information on ethnicity, race, and economic status is provided in this section as the baseline against which potential effects can be identified and analyzed.

3.16.1 Regulatory Context

3.16.1.1 Federal Regulations

United States Executive Order 12898—Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 CFR 7629, 16 February 1994)—directs Federal agencies to “make . . . achieving environmental justice part of its mission” and to identify and address “disproportionately high and adverse human health or environmental effect of its programs, policies, and activities on minority and low-income populations.”

United States Executive Order 13045—Protection of Children from Environmental Health Risks (April 21, 1997)—recognizes a growing body of scientific knowledge that demonstrates that children may suffer disproportionately from environmental health risks and safety risks. These risks arise, because (1) children’s bodily systems are not fully developed, (2) children eat, drink, and breathe more in proportion to their body weight, (3) their size and weight may diminish protection from standard safety features, and (4) their behavior patterns may make them more susceptible to accidents. Based on these factors, the President directed each Federal agency to make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children. The President also directed each Federal agency to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.

3.16.1.2 Planning Context: Pima County Comprehensive Plan

The goals of the Pima County Comprehensive Plan include infrastructure planning that will direct growth rather than react to the demands of developers, reducing overall community costs of accommodating growth. Limiting sprawl to designated growth areas would likely reduce total community costs to all residents within the Comprehensive Plan area. Land use policies that accommodate future population growth and carry out the compact form development goals of the Comprehensive Plan include the establishment of mixed-use designations and affordable housing programs.

3.16.2 Distribution of Low-income and Minority Populations

The percentage of the Pima County population that falls below 200 percent of the Federal Poverty Level in 2009 was 51.7 percent, higher than the State level of 49.2 percent. The community areas within Pima County with the highest percentage (greater than 80 percent) of the population below 200 percent of the Federal Poverty Level were (highest to lowest) Tohono O'odham Nation, Pasqua Yaqui Reservation, Tucson Central area, Tucson Southeast area, and Tucson North Central area (Coyle 2012).

Within Pima County, there are two American Indian Reservations—the Tohono O'odham Nation and the Pascua Yaqui Tribe and Reservation. The Tohono O'odham Nation is located in the western portion of Pima County and has a total land mass of 4,453 square miles, including the San Xavier Indian Reservation. The Pima County portions of the Nation counted 8,959 persons in 2010 (PAG 2012). The capital city, Sells, had census count of 2,495. The San Xavier Indian Reservation is the smaller eastern section of the Tohono O'odham Indian Reservation, and it lies in the southwestern part of the Tucson metropolitan area and consists of 111 square miles of land area. San Xavier had a 2000 census resident population of 2,053 persons. Total Tribal enrollment is estimated to be 23,890.

The Pascua Yaqui Tribe and Reservation is located in the southwestern part of the Tucson metropolitan area and adjacent to San Xavier Indian Reservation. The Pascua Yaqui Reservation has a land area of less than 1.9 square miles. The 2010 census counted 3,484 persons in the Pima County portions of the Pascua Yaqui Tribal lands (PAG 2012). Total Tribal enrollment is estimated to be 6,136 members.

Minorities are persons of Hispanic or Latino origin of any race, Blacks or African Americans, American Indians, or Alaskan Natives, Asians, and Native Hawaiian and other Pacific Islanders.

The Council on Environmental Quality identifies these groups as minority populations when either:

- The minority population of the affected area exceeds 50 percent; or
- The minority population percentage in the affected area is meaningfully greater than the minority population percentage in the general population or appropriate unit of geographical analysis.

In order to be classified as meaningfully greater, a local population must exceed the State minority population by 10 percent; in the State of Arizona, this threshold is 36.2 percent. Pima County's minority population is approximately 35 percent, which does not exceed the state minority population by 10 percent.

Pima County has an Urban Enterprise Zone that includes all of the City of South Tucson, central Tucson, portions of Marana, Sahuarita, parts of Pima County and parts of the Tohono O’odham Nation and Pascua Yaqui Indian Reservation. These Urban Enterprise Zones are designated to help encourage economic development in distressed neighborhoods through tax and regulatory relief to investors willing to launch businesses in the area. Pima County is also home to 15 designated Colonias. In Arizona, Colonias encompass all types of communities that meet the Federal definition of lacking sewer, wastewater removal, decent housing or other basic services (Coyle 2012).

4.0 Environmental Consequences

This chapter discusses impacts to each resource or issue that are expected to result from the implementation of the four alternatives identified under Section 2.1, Alternatives Considered. Alternatives B, C, and D, the action alternatives, each include Section 10(a)(1)(B) permit coverage for 44 species. All alternatives assume the continued implementation of the SDCP through measures such as acquisition of ranches and implementation of the CLS. Differences among alternatives are briefly summarized in Table 2.1 in Chapter 2.

The impacts of Alternatives B, C, and D (the action alternatives) are compared and discussed relative to Alternative A (the No Action Alternative). Under the No Action Alternative, Pima County would implement elements of the SDCP, which uses the CLS and other conservation measures to achieve conservation of natural and cultural resources. Because Pima County has been implementing elements of the SDCP since the early 2000s and reaffirmed its commitment to the SDCP in Resolution 2009-281, USFWS considers the No Action Alternative to be the baseline for impact avoidance and minimization and land management as described in the Affected Environment chapter.

Under the No Action Alternative, Pima County would continue to hold, acquire and lease land (County-controlled mitigation lands) to fulfill the SDCP ranch, mountain park, riparian, biological and cultural conservation goals (see Table 3.6 for a list of properties and Figure 3.11 for the location of ranch properties). These properties have been managed by various County departments, all of which have maintained conservation of natural resources (species, communities, and ecosystem structure and function) as top management priorities. Management activities on these lands have included the following:

- riparian protection, and at times, restoration and enhancement
- cleanup of trash from undocumented immigrants
- invasive species detection and management
- visitor use restrictions such as permits, road and trail restrictions, and prohibitions
- rangeland monitoring for annual assessment of condition and forage capacity
- adjustment of stocking rates based on assessment of conditions on many County-owned ranches and establishment of grazing standards and guidelines to improve range condition and wildlife habitat

- ranch activities authorized by Pima County, such as construction and maintenance of infrastructure (including construction of new stock waters, cattle guards, and fencing on County-managed lands)
- law enforcement protection

For purposes of analysis, this level of management is assumed to be continued under the No Action Alternative. All action alternatives would require an enhanced level of management as compared to the No Action Alternative. The action alternatives also include ecological monitoring, which would not occur under the No Action Alternative.

Pima County has adopted policies, ordinances, and procedures for natural resource conservation. Most of these are impact avoidance and minimization measures that did not exist before the SDCP was developed, but are currently being implemented and would continue to be implemented under all alternatives. For example, the Pima County BOS has consistently applied the CLS conservation guidelines and achieves Natural Open Space Set-asides for development within the CLS. Pima County also:

- applies Watercourse and Riparian Habitat Protection and Mitigation Requirements (a Pima County code) to development along riparian areas
- requires property surveys prior to rezoning to determine the location of key biological resources including saguaros, ironwood trees, and Pima pineapple cactus. These data are used to develop a project design that avoids and minimizes impacts to these resources.
- applies the Native Plant Preservation Ordinance to ensure that individual plants outside of set-aside areas are protected or replaced
- implements the Environmentally Sensitive Roadway Design Guidelines which seek to minimize impacts associated with the construction and maintenance of roadways through design, replantings, erosion control and siting
- supports and participates in decisions related to the Regional Transportation Authority's \$45-million fund for retrofitting roadways to incorporate wildlife-friendly roadway crossings
- implements the Community Participation and Mitigation Ordinance that requires alternative analysis and community input on County roadway designs
- uses its Exit Gate project management procedure for Capital Improvement Projects. This procedure requires avoidance and minimization during initial planning, and consultation with County staff regarding potential impacts to riparian habitat, floodplain, and cultural resource impacts.

- uses the Checklist for Natural Resources, Parks, and Recreation Projects with the objective of reducing impacts of public access, trails, and recreation and associated infrastructure and requiring a biological assessment during the design process
- evaluates impacts resulting from disposition of County lands to other parties
- implements the Pima County Sustainability Action Plan requiring siting and design of new County facilities and infrastructure to avoid or minimize impacts to the CLS and cultural resources
- requires new sewer alignments to be planned under/along roadways rather than in or along washes
- mandates and enforces control of non-native weeds (especially buffelgrass) on private property
- limits outdoor lighting in sensitive areas through the Outdoor Lighting Code

Total habitat disturbance expected to occur during the proposed 30-year permit period is the same under all alternatives because Pima County has already adopted the above measures under the SDCP to avoid and minimize impacts. Thus, ground-disturbing activities—land and infrastructure development, and building by the public and private sectors—are expected to occur similarly under all alternative scenarios regardless of whether a Section 10(a)(1)(B) permit is issued or the extent of Covered Activities. For certain Covered Species, specific commitments under the three action alternatives could reduce take over the No Action Alternative.

The fundamental difference between the action alternatives in terms of potential impacts is the extent of proposed Covered Activities and the resulting acreages affected through enhanced monitoring, management and mitigation. The current built environment for eastern Pima County is shown in Table 4.1 and Figure 4.1. Covered Activities and resulting acreages affected for each action alternative are shown in Table 4.2 and Figure 4.2 (Alternative B), Figure 4.3 (Alternative C), and Figure 4.4 (Alternative D).

Impacts related to the No Action Alternative (see Figure 4.1, shown in orange) shows the same development footprint as Alternative C (see Figure 4.3), with the key difference being that development under Alternative A will not be covered under the Section 10(a)(1)(B) permit. Therefore, there would be no mitigation required for Alternative A.

**TABLE 4.1
CURRENT BUILT ENVIRONMENT AND REGIONAL RESERVES (ACRES)
WITHIN THE PLANNING AREA**

Relationship to CLS	CLS Category	Total Permit Area	Current Built Environment	Regional Reserves*
Inside CLS	Biological Core Management Area	899,915	11,462	450,757
	Important Riparian Area	158,178	8,875	65,680
	Multiple Use Management Area	950,505	27,039	667,325
	Special Species Management Area	997,582	15,631	582,776
	Agricultural Inholdings	9,691	540	17
	Scientific Research Area	54,000	0	0
Outside CLS		456,513	166,904	5,207
Total		3,526,384	230,451	1,771,762

CLS = Maeveen Marie Behan Conservation Lands System

*Note: Acres shown for Regional Preserves includes County properties managed for open-space and habitat protection, Federally managed lands (i.e., National Parks, Forests, Monuments, and Las Cienegas National Conservation Area), and the Santa Rita Experimental Range.

**TABLE 4.2
COVERED ACTIVITY IMPACTS (C) TO CLS AND CORRESPONDING MITIGATION (M)
IN THE PERMIT AREA BY ALTERNATIVE**

CLS Category	Alternatives					
	B		C		D	
	C	M	C	M	C	M
Biological Core Management Area	87	434	34,302	137,208	8,771	43,855
Important Riparian Area	729	3,644	8,263	33,052	2,134	10,670
Multiple Use Management Area	121	362	26,012	52,024	12,554	37,662
Special Species Management Area	109	547	7,541	30,164	291	1,455
Agricultural Inholdings	1	2	113	0	1	2
Outside of CLS	1,468	2,936	35,202	0	11,336	22,672
Total	2,514	7,924	111,433	252,448	35,087	116,316
Proposed Pima County Coverage under each Alternative ^a	5,000	16,000	111,433	252,000	36,000	116,000

CLS = Maeveen Marie Behan Conservation Lands System

^aCovered Activities and mitigation would occur based on actual impacts. Mitigation would be determined by location of the impact relative to the CLS and commitments outlined in the MSCP. See Chapter 2 for additional details. Numbers shown are for the 30-year permit period and are for the Permit Area only. Numbers are in acres unless otherwise noted.

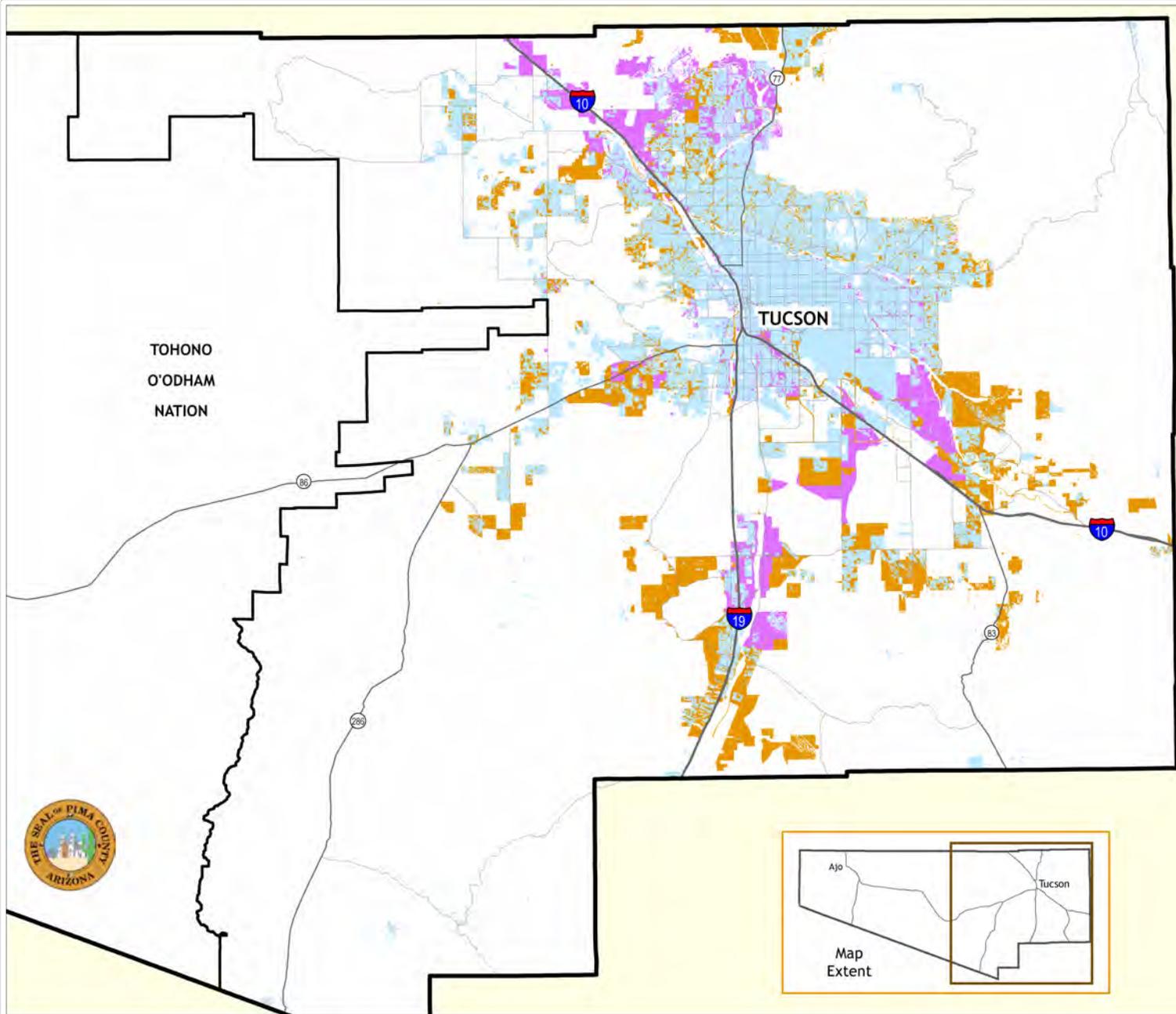
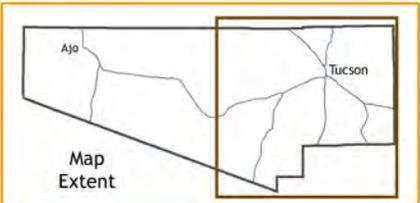
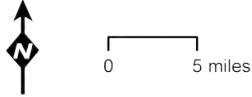


Figure 4.1
Existing and Projected
Development through 2040
under Alternative A
(No Action)

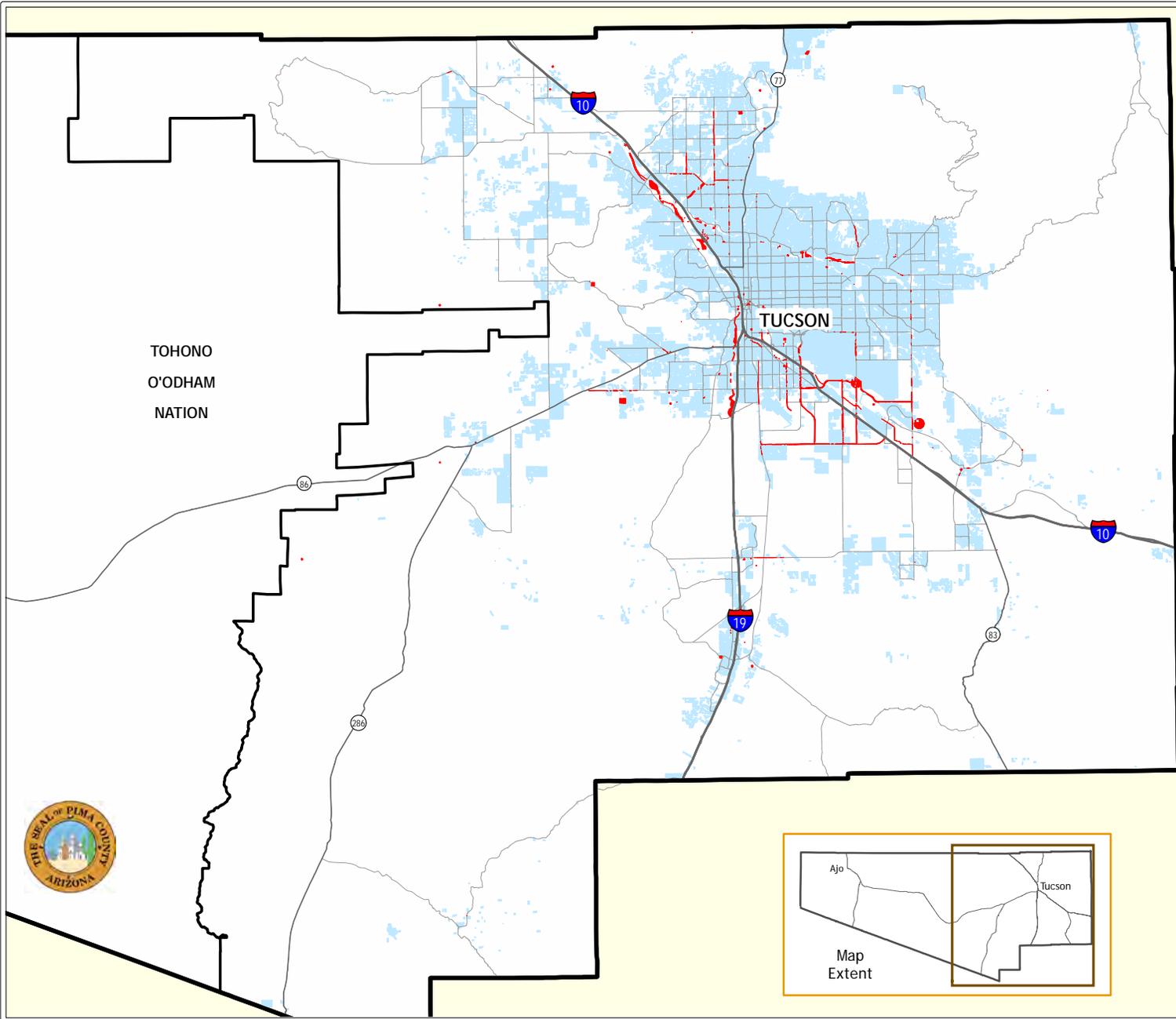
- Projected Development in the Permit Area that would not be covered by the Section 10 Permit (111,430 acres)
- Projected Development outside the Permit Area that would not be covered by the Section 10 Permit (61,360 acres)
- Existing Development Footprint for Year 2008 (234,900 acres)



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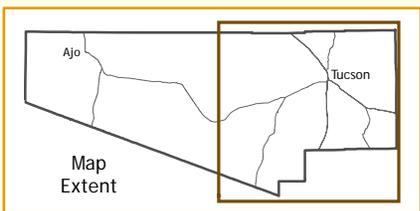
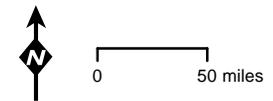
Figure 4.2
 Covered Development
 through 2040
 under Alternative B



TOHONO
 O'ODHAM
 NATION



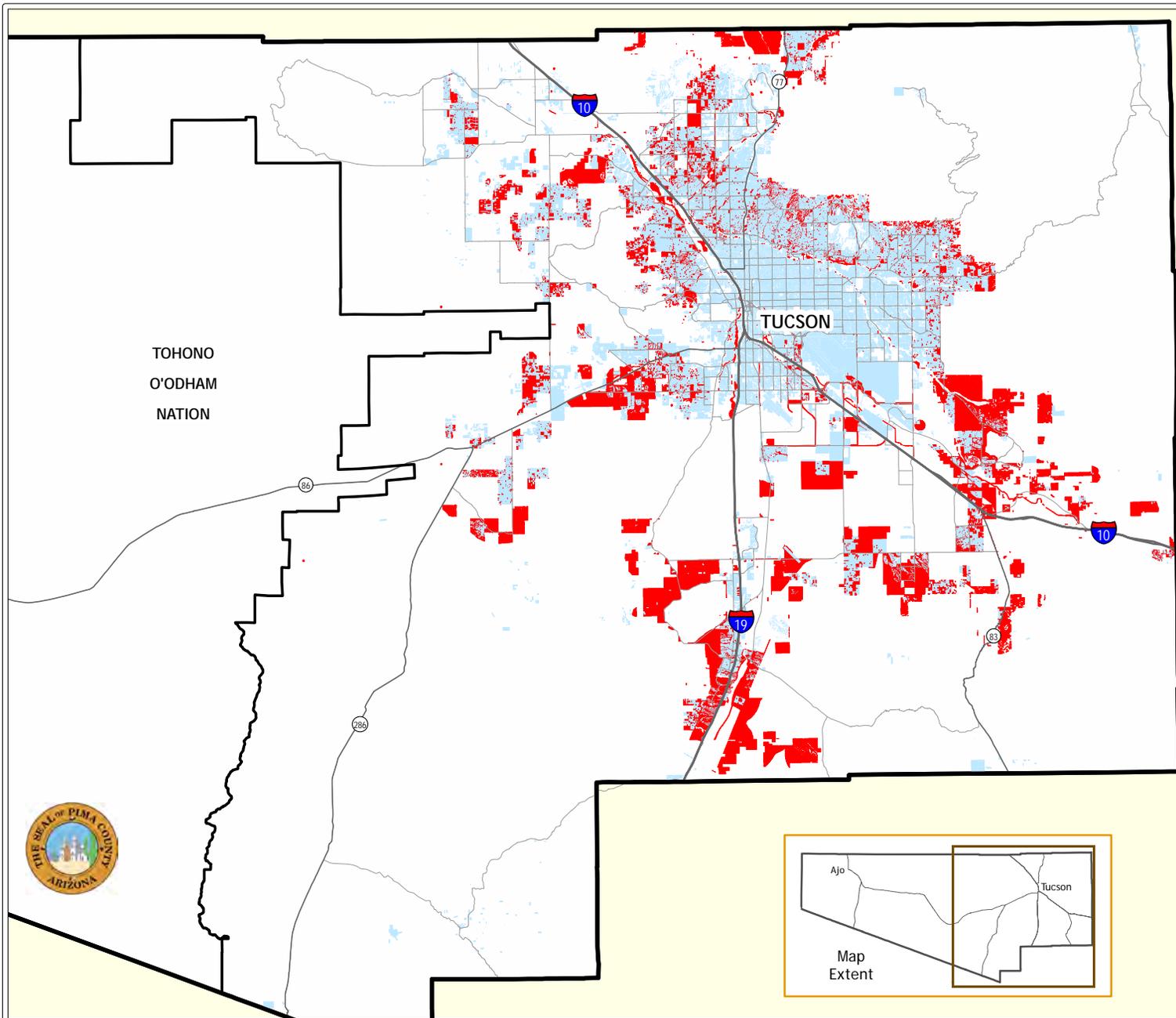
- Projected Covered Impacts in Alternative B (2510 acres)
- Existing Development Footprint for Year 2008 (230,460 acres)



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Figure 4.3
 Covered Development
 through 2040
 under Alternative C



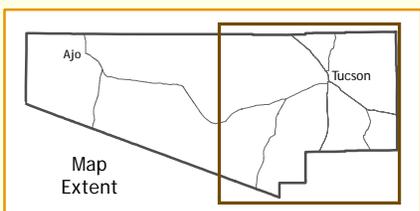
TOHONO
 O'ODHAM
 NATION

TUCSON

- Projected Covered Impacts in Alternative C (111,430 acres)
- Existing Development Footprint for Year 2008 (234,900 acres)



0 5 miles

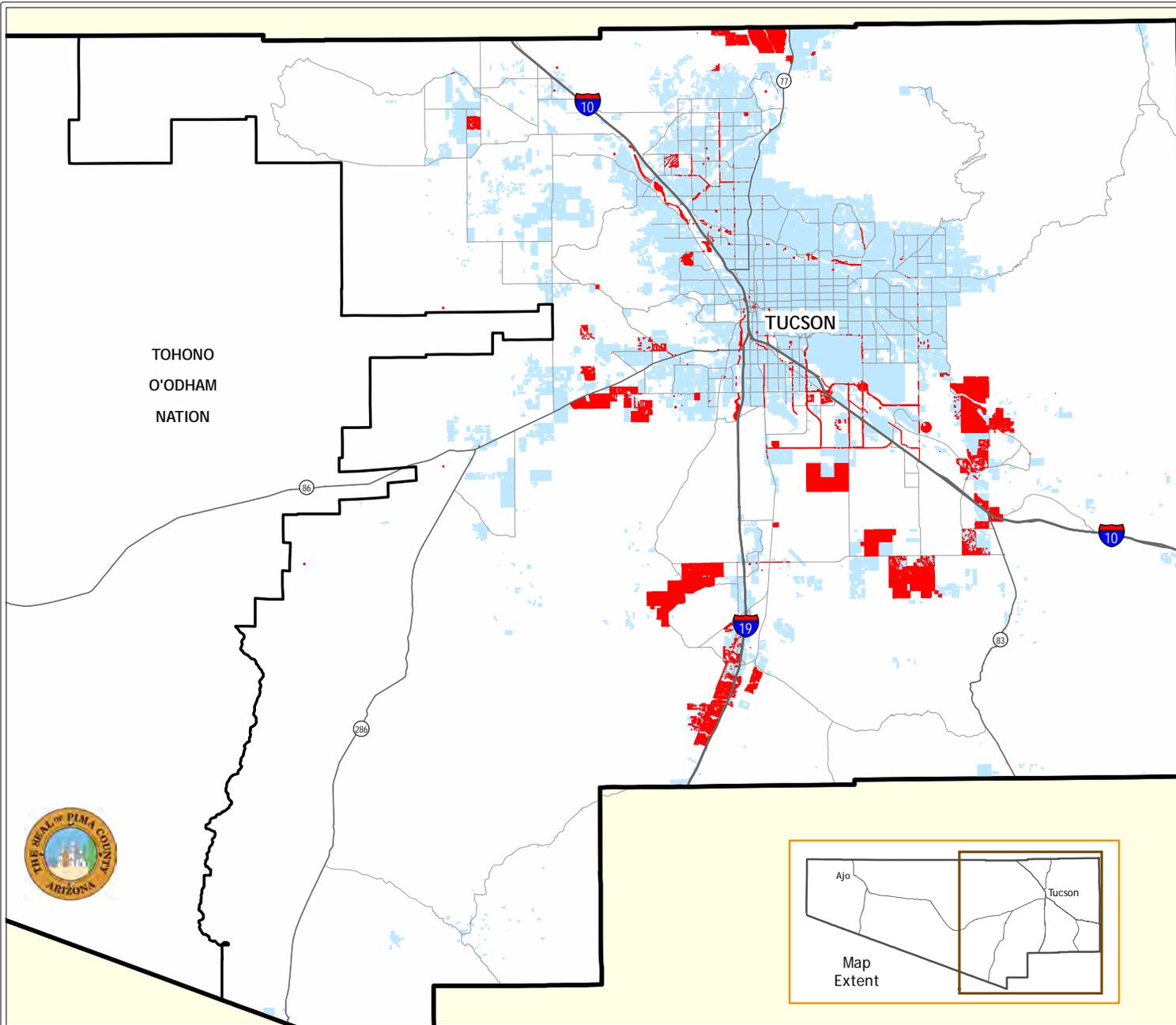


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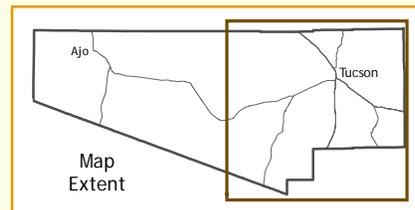
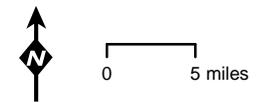
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Figure 4.4
 Covered Development
 through 2040
 under Alternative D



- Projected Covered Impacts in Alternative D (35,090 acres)
- Existing Development Footprint for Year 2008 (234,900 acres)



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There are five key distinctions between the action alternatives and No Action Alternative in terms of conservation:

- 1) **Conservation of land in perpetuity:** Pima County lands acquired for open-space protection and other purposes as part of the SDCP would be used as mitigation for Covered Activities under all action alternatives. Mitigation lands for which 100 percent mitigation credit is sought would be committed to conservation in perpetuity only under the action alternatives and through the conveyance of perpetual conservation easements between Pima County and a third party beneficiary (preferably USFWS or AZGFD). The amount of land required for mitigation would vary among the action alternatives. Alternative B would require the least amount of mitigation land. Alternative C would require the greatest amount of mitigation land—an amount far in excess of the acreage of the current set of County-acquired open-space properties. Alternative C would require a significant amount of additional bonding for open space acquisition or for private sector beneficiaries to pay a greater share of the mitigation lands acquisition costs. Alternative D (Preferred Alternative) would require an intermediate amount of land for mitigation (and could include the acreage of mitigation lands pledged to date).
- 2) **Credit for leased State Trust Lands and improved conditions on County-owned lands:** Pima County proposes a hierarchical *Stewardship Level*-program for the action alternatives, whereby the County would receive, at minimum, 25-percent mitigation credit for County-leased State Trust Lands during the 30-year permit period (Section 4.4 of the Pima County MSCP). As leased land parcels receive increasing levels of protection or habitat conditions and values improve through management actions, Pima County would seek additional mitigation credit. Determination of condition improvement would be determined by an independent science advisor group and would be weighed against baseline conditions, which would need to be established prior to Pima County seeking these additional credits. The need to acquire leased land and subsequently improve conditions depends on the action alternative and its associated mitigation requirement, such that greatest incentive for improved conditions exists for the alternative with the higher impact (Alternative C). No additional stewardship incentive would exist under the No Action Alternative or Alternative B.
- 3) **Continued land acquisitions:** Alternatives C (and to a lesser extent Alternative D) contains incentives for future land acquisitions by Pima County to achieve the mitigation goals set out in the MSCP. The No Action Alternative and Alternative B would not require additional acquisitions to be made for habitat conservation purposes.
- 4) **Land management and species-specific commitments:** Pima County would commit to land management and species-specific management conservation measures on mitigation lands only under the three action alternatives. These

measures would include seeking species reintroduction (where appropriate) and eradicating invasive species. The geographic extent of these efforts would be commensurate with the impacts of the action alternative.

- 5) **Monitoring:** A program for long-term ecological monitoring—the repeated collection of information to determine trends in resources—would be carried out under all action alternatives commensurate with the scale of the mitigation program. Monitoring for all alternatives would cover both compliance and effectiveness monitoring. The extent of the monitoring program would vary from species-level monitoring and landscape monitoring (Alternative B) to a large set of program elements: habitat, threats, and climate factors (Alternatives C and D). No monitoring program would occur under the No Action Alternative.

The USFWS proposes Alternative D as the preferred biological alternative because it:

- allows other privately owned properties to gain access to the benefits of the permit for a fee;
- creates a mitigation program that is fiscally reasonable to achieve given the commitments to date and the potential for land acquisition funding and land availability in the future;
- provides Pima County with an opportunity to use the current suite of County-controlled mitigation lands as a significant “down payment” to mitigation of Covered Activities;
- provides long-term legal protection of Pima County's fee-titled conservation lands, thereby providing a habitat protection target ratio of 1:1 for most extant species based on the current suite of County-controlled mitigation lands;
- proposes management and future monitoring programs on a spatial and financial scale that is commensurate with the mitigation program; and
- provides coverage to the private sector while maximizing the opportunity to avoid and minimize impacts to Covered Species.

4.1 Existing and Projected Footprint of Development-related Activities

As shown in Table 4.1 and Figure 4.1 above, the current built environment in eastern Pima County has a spatial footprint of approximately 230,000 acres or about 6.5 percent of the 3.5-million-acre Planning Area.

Regional reserves are those lands that are under the jurisdiction of Federal, State, County, or other entities and are managed for conservation or purposes that promote conservation. These lands include, but are not limited to, Coronado National Forest, Saguaro National Park, Organ Pipe Cactus National Monument, Ironwood Forest National Monument, Buenos Aires National Wildlife Refuge, Cabeza Prieta National Wildlife Refuge, Catalina State Park, and Tucson Mountain Park (lands within the Tohono O'odham Nation are not included within the Permit Area). These existing Regional Reserves within Pima County constitute approximately 1.7 million acres, or 50 percent of the Planning Area (see Table 4.1).

The development footprint for the entire Planning Area is projected to increase approximately 75 percent by the end of the 30-year permit period with the addition of approximately 172,000 acres of land disturbance. Projected future development in Pima County has the potential to adversely impact biological resources based on projected land consumption in eastern Pima County (see Figure 4.1).

The land absorption model used to predict the extent and location of future growth in eastern Pima County is reviewed in Appendix G of the Pima County MSCP. The model is based on the "status quo" scenario jointly developed for the City of Tucson and Pima County (2009) water and wastewater infrastructure study.

While the model is useful for the purposes of this analysis, future growth patterns could vary significantly from the model due to two primary factors. First, the location of development may change from the modeled paradigm of low-density peripheral development to a more compact urban form that concentrates growth in areas that are already developed. This growth form would likely lead to fewer impacts on all conservation targets (CLS categories Biological Core Management Area and Important Riparian Areas, in particular; Special Elements; and most Covered Species). Second, the rate of development may vary significantly from the model, which assumes that approximately 559,000 new inhabitants will move to eastern Pima County over the next 30 years. These projections are based on 2008 Department of Economic Security projections. However, if development continues at 2011 rates, far fewer new homes would be needed and a smaller development footprint would result. Given these uncertainties regarding future location and rate of development-related activities, the modeled impacts on conservation targets are conservative.

Additionally, the projected acres of growth and development-related impacts on the CLS, Special Elements, or Covered Species are conservative. For analysis purposes it is assumed that the entire footprint of development would be impacted. It is expected that not all developed land is or will be permanently impacted. In many cases, significant areas of undeveloped open space are retained due to regulatory avoidance and minimization measures (e.g., County-required Natural Open Space Set-asides, riparian protection provisions of the floodplain ordinance) and/or building "envelopes" (i.e.,

maximum disturbance footprint) that require footprints to be smaller than the total size of the parcel on which they are allowed.

4.2 Physical Environment

4.2.1 Criteria for Determining Significance

The criteria for determining significance of impacts of alternatives on the physical environment are outlined below. Impacts would be significant if implementation would:

- substantially alter important geologic features, elevation profiles, soil conditions, or capacities or flow patterns of watercourses; or
- conflict with any Federal regulations or policies relevant to soil erosion or floodplain protection.

4.2.2 No Action Alternative

Under the No Action Alternative, Pima County would not apply for a Section 10(a)(1)(B) permit and ESA compliance would continue on a project-by-project basis, as required. Land and infrastructure development, and building by the public and private sectors, would continue as projected. Under this alternative, impacts to the physical environment would continue to be analyzed on a case-by-case basis, depending on the project and permitting requirements.

Under the No Action Alternative, Pima County would continue to implement elements of the SDCP and continue to use the CLS and other conservation measures to achieve conservation of natural and cultural resources. Land acquisition and lease of land to fulfill the SDCP goals would continue. Beneficial effects of conserving land and thereby avoiding or minimizing surface impacts and retaining or restoring the intactness of the physical environment would continue to accrue under the No Action Alternative.

The No Action Alternative (i.e., not issuing a Section 10(a)(1)(B) permit) includes 30 years of projected urban development within the Permit Area. Development activities and other indirect and cumulative effects under this alternative would likely result in changes to geologic features, elevation profiles, soil conditions, and capacities or flow patterns of watercourses. These issues would be dealt with on a case-by-case basis under the No Action Alternative. This alternative would not conflict with any Federal regulations or policies relevant to soil erosion or floodplain protection.

4.2.3 Alternatives B, C, and D (Preferred Alternative)

Under Alternatives B, C, and D, a Section 10(a)(1)(B) permit would be issued for proposed Covered Activities (that vary by alternative as described in Table 4.2). Covered

Activities include ground disturbance and development within the Permit Area. These Covered Activities would be a subset of actions affecting the physical environment within the Permit Area under the No Action Alternative. Therefore, the overall effect to the physical environment from these alternatives would be expected to be less than the No Action Alternative; how much less would be dependent on the alternative selected (Alternative B having the fewest impacts and Alternative C the most impacts). Conditions of the Section 10(a)(1)(B) permit that would require the conservation of the physical environment for those activities covered under the permit have been adopted by Pima County, in advance of the permit request.

Components of Pima County's physical environment (i.e., geomorphology, geology, soils, elevation, drainage, and climate) would continue to be altered under issuance of a Section 10(a)(1)(B) permit; however, these alterations would be the same as those that would occur under the No Action Alternative. Drainage patterns, such as the direction of flow of the major rivers, would not be changed on a regional level, but could be altered on a smaller scale, particularly on high-density developments outside the CLS and on some Capital Improvement Program projects. Generally, the conservation of open space would continue to be one of the primary tools Pima County uses to protect the physical condition of the County's watersheds.

Beneficial effects of conserving land and thereby avoiding or minimizing surface impacts and retaining or restoring the intactness of the physical environment would continue to accrue under the three action alternatives. The element of conservation in perpetuity included in the three action alternatives would provide assurances that physical environment intactness would be retained into the future on the County-owned mitigation lands.

4.3 Water Resources

4.3.1 Criteria for Determining Significance

The criteria for determining significance of impacts of alternatives on water resources are outlined below. Impacts would be significant if implementation would:

- conflict with Federal regulations regarding Traditional Navigable Waters;
- conflict with any regulations, policies or ordinances relevant to surface or drinking water quality standards (including the Clean Water Act);
- reduce water resources to the point that Pima County may lose assured water supply designation; or
- reduce water resources providing essential habitat for federally listed and Pima County Covered Species.

4.3.2 No Action Alternative

Under the No Action Alternative, Pima County would not apply for a Section 10(a)(1)(B) permit and ESA compliance would continue on a project-by-project basis, as required. Direct adverse impacts to water resources would likely continue to occur as land and infrastructure development, and building by the public and private sectors, continues to occur as projected. Under this alternative, impacts to water resources would continue to be analyzed on a case-by-case basis, depending on the project and permitting requirements and no large-scale conservation efforts would occur.

Beneficial effects of the No Action Alternative include the conservation and protection of important riparian areas and water quality, which Pima County would continue to require for those projects needing rezoning, conditional use permits, or other County-discretionary permits. Conservation and protection of important riparian areas and water quality would continue as long as guidelines, policies, and ordinances are upheld by the County BOS and the Pima County RFCD floodplain ordinance.

The No Action Alternative would not conflict with any Federal regulations regarding Traditional Navigable Waters or conflict with any regulations, policies, or ordinances relevant to surface or drinking water quality standards. The No Action Alternative may reduce water resources, particularly in areas such as Arivaca Creek, San Pedro River, and Cienega Creek where population growth may jeopardize water supplies. Overall, Pima County is not likely to lose assured water supply designation. Water resources providing essential habitat for federally listed and Pima County Covered Species may be reduced.

4.3.3 Alternatives B, C, and D (Preferred Alternative)

Under Alternatives B, C, and D, a Section 10(a)(1)(B) permit would be issued for proposed Covered Activities (that vary by alternative). Covered Activities include ground disturbance and development, which could result in potential impacts to water resources. Covered Activities for grading permits, plats, and development plans are currently subject to certain water resource conservation requirements of the rezoning process, which were adopted by Pima County in advance of the proposed Section 10(a)(1)(B) permit.

Issuance of a Section 10(a)(1)(B) permit for proposed Covered Activities under Alternatives B, C, and D would not likely affect the water supply (quantity available) on a regional level, but could have an adverse effect (reduction of water supply) on a smaller local scale, particularly in areas proposed for high-density development outside the CLS and some Capital Improvement Program project areas. Generally, the conservation of open space to minimize the effects of Covered Activities on federally listed species would continue to be one of the primary tools used to protect the water supply found within Pima County's watersheds. The Section 10(a)(1)(B) permit would result in

conservation easements and ranch management agreements that would result in restrictions on water development within these mitigation lands, a beneficial impact to water resources in the Permit Area. The reduction of water supply is likely to be the greatest under Alternative C, with increasingly reduced water use under Alternatives D and B, respectively. However, because the projected development in Pima County is likely to occur regardless of whether an incidental take permit is issued, none of the alternatives would significantly affect overall water use and supply when compared to the No Action Alternative and, overall, Alternatives B, C, and D would not reduce water resources to the point that Pima County may lose assured water supply designation.

All alternatives adopt the SDCP as the guiding document that directs resources to water and riparian and aquatic resources. Therefore, all alternatives, including the No Action Alternative, would seek to adopt and/or continue to adhere to the following riparian area protection and management principles:

- maintain or restore the connection between interdependent components of river systems (channel, overbank floodplain, distributary flow zones, riparian vegetation, and connected shallow groundwater) and maintain or restore natural flooding and sediment balance
- preserve or re-establish the connection between channels and their floodplains, and channels and their distributary flow zones
- maintain or re-establish hydrologic connections between riparian, aquatic ecosystems, and shallow groundwater zones
- manage watershed uplands as appropriate to protect the functioning of riparian and aquatic ecosystems within the watershed
- manage point-source and non-point-source pollution to maintain water quality at a level needed to support Pima County MSCP biological goals
- ensure sufficient in-stream flows to achieve and protect natural functions of riparian and aquatic ecosystems
- continue to acquire, manage, monitor, and protect water rights and water resources

Population growth, land development, and associated groundwater pumping would occur under all alternatives, and to the relatively same extent, but would not be triggered by them. Pima County's ability to protect relatively undeveloped watersheds under the three action alternatives is greater than under the No Action Alternative due to the action alternatives' ability and commitments to bring large blocks of open space into long-term conservation status. This is expected to support long-term beneficial effects (improved conditions) of the watersheds both in Pima County and in downstream areas. The amount of land that would be required to mitigate for Covered Activities under Alternative

B (up to 16,000 acres of mitigation land) would be considerably smaller than under Alternatives C or D (252,000 acres and up to 116,000 acres, respectively; see Table 4.2).

Under Alternatives B, C, and D, Pima County's adherence to and requirements for riparian protection would be an integral part of complying with the Section 10(a)(1)(B) permit conditions in the form of on-site minimization and mitigation.

Alternatives B, C, and D would each provide a greater level of long-term protection and conservation of County-wide water resources by their use of conservation easements. Assured long-term conservation of large areas of intact landscapes would facilitate the retention and restoration of floodplain hydraulics, which would in turn slow storm water flows, store more water in the watershed, and reduce destructive impacts of floodwaters.

Impacts on Covered Species habitat within Waters of the United States (WUS) were analyzed as part of Covered Activities, using the same model of projected development as used for other habitat impacts. There is uncertainty with regard to the exact location, extent, and severity of future disturbance, particularly with respect to private Covered Activities. Disturbances to WUS from County Covered Activities are better known and would often take place in areas that have been previously disturbed, such as the Santa Cruz River, which contains bank protection and other features of past disturbance. As part of the MSCP, a programmatic approach has been developed for consultation of certain nationwide permits and regional general permits (see Section 3.5.1 of the MSCP). Some Covered Activities that impact WUS may require individual 404 permits, requiring further analysis of impacts. The Army Corps of Engineers would be consulted on a project-by-project basis for these activities.

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 Army Corps of Engineers' requirements for compensatory mitigation. Mitigation fees paid to the In-Lieu Fee or Mitigation Bank sponsor pursuant to the 2008 Army Corps of Engineers/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 mitigation activities required by the Army Corps of Engineers that improve the condition of the land as Section 10 mitigation, as indicated in MSCP 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.

Based on modeling, an estimated 700 acres of direct impacts may occur to WUS from Covered Activities. Pima County will implement a series of conservation measures, as outlined in Section 4 of the MSCP, to minimize and mitigate for potential impacts to

WUS. The number of modeled acres of potential disturbance to WUS is small in comparison to the overall impacts from Covered Activities. Impacts to WUS would primarily be short-term and, in most cases, result in long-term beneficial effects to Covered Species and riparian habitats.

Overall, Alternatives B, C, and D would not conflict with any Federal regulations regarding Traditionally Navigable Waters, WUS, or conflict with any regulations, policies, or ordinances relevant to surface or drinking water quality standards. In addition, the three action alternatives would not reduce water resources to the point that Pima County may lose assured water supply designation or significantly reduce water resources providing essential habitat for federally listed and Pima County Covered Species. Mitigation and the associated ability to control water use on County-controlled mitigation lands would increase from Alternative B to Alternative D to Alternative C, as would the potential benefit to water conservation and water resources.

4.4 Biological Resources

4.4.1 Criteria for Determining Significance

The criteria for determining significance of impacts of alternatives on biological resources are outlined below. Impacts would be significant if implementation would:

- have a substantial adverse effect, either directly or through habitat modifications, on any Covered Species, Federal or State species, or migratory bird;
- interfere substantially with the movement of any native wildlife species or impede the use of wildlife linkages; or
- promote the introduction or spread of invasive or non-native species.

The analysis of the potential impacts to biological resources focuses on four key conservation elements—Special Plant Communities and Other Special Elements, Covered Species and their habitat, and the CLS—and the extent to which they are affected by the Covered Activities under each alternative. Evaluation of the conservation commitments focuses on three of these key elements because they were identified and prioritized by the STAT, as articulated in numerous planning documents (e.g., Fonseca et al. 1999; Pima County 2000b, 2001d, e, g; RECON 2001).

The geographic focus of the biological resources impact analysis is eastern Pima County. This is where the greatest percentage of Pima County's population resides and where future growth is projected to occur. Future land consumption was not modeled for western Pima County, where the majority of land is in Federal ownership. Analyses used GIS overlays to project the amount (in acres) of growth and development-related impacts and their location with respect to political jurisdictions and land ownership within

eastern Pima County. Because the growth and development-related impacts of all alternatives would have the same spatial footprint (as described in Section 4.1), the GIS impact analysis placed special emphasis on:

- quantifying regional impacts to key conservation targets: Special Plant Communities and Other Special Elements, Covered Species, and CLS
- comparing mitigation commitments needed for each EIS alternative, as measured by CLS category
- quantifying the conservation value—as measured by the Covered Species and CLS—of the current set of mitigation lands (i.e., those lands acquired for conservation purposes since 1999 that would be used for mitigation of future impacts)

4.4.2 Plant Communities and Other Special Elements

Plant communities and other special elements (hereafter called Special Elements) were identified and mapped during the SDCP planning process because they represented important habitat for PVS and/or because they were rare in Pima County. Table 4.3 shows the spatial extent of Special Elements and projected impacts to each element at the end of the 30-year permit period. Special Elements range in extent from fewer than 30 acres (cattail) to more than 3 million acres (palo verde–mixed cacti). Impacts to Talus Slopes were not projected using GIS due to spatial inaccuracies in the mapped talus slope distribution as identified by Pima County (Fonseca 2009). The footprint of the current built environment intersects mapped Special Elements disproportionately, from less than 1 percent for nine Special Elements to 10 percent for the Mesquite Bosque Special Element.

Table 4.4 summarizes projected impacts to Special Elements by jurisdiction. The majority of projected impacts on Special Elements, both inside and outside of Pima County's Permit Area, would occur within the Permit Area. Projected impacts on all Special Elements are greater within the Permit Area than all other jurisdictions combined, except for the Ironwood and Creosote–Bursage Elements, for which more impacts are projected to occur within the Town of Marana. Moreover, projected impacts in the Permit Area represent approximately 95 percent of the projected impacts for nine of the 17 Special Elements for which some loss of habitat is projected to occur.

The spatial extent of future development-related impacts to Special Elements would be the same under all alternatives. Development is projected to continue to impact many of the riparian and aquatic Special Elements such as intermittent streams, mesquite bosques, and Sonoran riparian scrub, although no impacts are projected for other riparian features such as unincised floodplain or cattail.

**TABLE 4.3
SPATIAL EXTENT OF SPECIAL ELEMENTS IN THE PLANNING AREA AND PROJECTED IMPACTS**

Special Element	Total Spatial Extent (acres)	Existing Built Environment (acres)*	Existing Built as % of Total Extent	Total Impacts in Permit Area (acres)	Total Projected Impacts as % of Extent
Cattail	29	0	0	0	0
Cottonwood–Willow	3,405	40	1.2	70	2.1
Creosote–Bursage	978,696	3,952	0.4	3,134	0.3
Douglas Fir–Mixed Conifer	709	2	0.3	0	0
Unincised Floodplain	83,188	940	1.1	0	0
Interior Southwest Riparian Deciduous Forest	6,872	34	0.5	236	3.4
Intermittent (Ephemeral) Streams with 300-foot Buffer	16,639	741	5	847	5
Ironwood Desert Scrub	403,569	11,239	2.8	12,325	3.1
Limestone Outcrop	53,806	505	0.9	2,201	4.1
Mesquite Bosque	26,470	2,634	10	1,829	6.9
Native Upland Grassland	435,558	2,230	0.5	3,257	0.7
Oak Scrub Grassland Ecotone	130,388	297	0.2	776	0.6
Perennial Streams with 300-foot Buffer	5,124	85	1.7	222	4.3
Palo Verde–Mixed Cactus	3,084,136	109,348	3.5	88,854	2.9
Sacaton Grasslands	10,145	20	0.2	0	0
Saltbush	34,872	76	0.2	409	1.2
Springs with 300-foot Buffer	1,672	23	1.4	28	1.7
Sonoran Riparian Scrub	169,560	14,153	8.3	19,325	11.4
Talus and Colluvium	3,473	0	0	14	0.4
Talus Slopes ^a	3,694	29	0.8	612	16.6
Low Elevation Valley Floors (<2,500 feet)	1,161,802	28,822	2.5	14,568	1.3

*Existing built environment is not mutually exclusive; this category can overlap with available habitat
Numbers shown reflect projected impacts at the end of the 30-year permit period.
Numbers are in acres unless otherwise noted.

**TABLE 4.4
PROJECTED IMPACTS TO SPECIAL ELEMENTS BY JURISDICTION**

Special Element	Jurisdiction (Acres)						Impacts in Permit Area ^a	
	Marana	Oro Valley	Sahuarita	South Tucson	Tucson	Pima County Permit Area ^b	Total	% of Impacts in Permit Area
Cattail	0	0	0	0	0	0	0	NA
Cottonwood–Willow	0	0	0	0	0	70	70	100
Creosote–Bursage	1,619	0	0	0	365	1,121	3,143	36
Douglas Fir–Mixed Conifer	0	0	0	0	0	0	0	NA
Unincised Floodplain	0	0	0	0	0	0	0	NA
Interior Southwest Riparian Deciduous Forest	0	0	0	0	0	231	236	98
Intermittent Streams with 300-foot Buffer	6	6	0	0	2	767	788	97
Ironwood Desert Scrub	5,877	1,009	0	0	4	5,349	12,325	43
Limestone Outcrop	0	0	0	0	0	2,170	2,201	99
Mesquite Bosque	41	3	0	0	100	1,623	1,829	89
Native Upland Grassland	0	0	0	0	0	3,146	3,257	97
Oak Scrub Grassland Ecotone	0	0	0	0	0	770	776	99
Perennial Streams with 300-foot Buffer	3	0	0	0	0	218	222	98
Palo Verde–Mixed Cactus	9,378	5,752	4,351		15,109	52,117	88,854	59
Sacaton Grasslands	0	0	0	0	0	0	0	NA
Saltbush	7	0	70	0	0	332	409	81
Springs with 300-foot Buffer	0	0	0	0	0	28	28	98
Sonoran Riparian Scrub	2,507	1,180	436	3	3,228	11,893	19,325	62
Talus and Colluvium	0	0	0	0	0	14	14	100
Talus Slopes	88	0	0	0	0	363	612	59
Low Elevation Valley Floors (<2,500 feet)	4,936	19		25	1,207	7,823	14,568	54

Numbers shown reflect projected impacts at the end of the 30-year permit period.

Numbers are in acres unless otherwise noted.

Acres of impact for Pima County reflect those of Alternative C.

^a The number of acres in the Permit Area is the sum of all the acres of projected impacts in the jurisdictions plus the area of County CIP projects and some State lands that are outside the County's Permit Area.

^b Includes lands currently owned by the State of Arizona and within unincorporated Pima County that have been planned for development. Also includes lands within other incorporated jurisdictions that are owned by Pima County.

A closer examination of the impacts that are predicted to occur as a result of non-discretionary activities provides some important context for the high level of regional disturbance to Special Elements. Although many impacts to Special Elements would have a majority footprint in the Permit Area, most of these impacts are predicted to result from non-discretionary activities (activities for which Pima County has no regulatory control). Under the action alternatives, the Section 10(a)(1)(B) permit would result in conservation of lands to mitigate the effects of Covered Activities on federally listed species. Under Alternative C, conservation lands would be greatest (252,000 acres), leading to reduced development potential within the lands. Conservation of lands for listed species would also lead to the protection of riparian areas. Similar effects would occur under Alternative D, but to a lesser extent (up to 116,000 acres of conservation lands). Alternative B would require the least amount of conservation lands compared to the other two action alternatives.

4.4.3 Covered Species Habitat

For this analysis, Priority Conservation Areas (PCAs) were used to estimate habitat disturbance or loss (Pima County 2001a), with the exception of two species (Tumamoc globeberry and Sonoran population of the desert tortoise) for which high and medium modeled habitat were used. PCAs represent the most important areas for species conservation based on the best information that was provided by species experts that advised STAT. The spatial extent of each PCA is typically an overestimate of the amount of land area currently used by a species, and as such is a reasonable trade-off between areas currently occupied and modeled habitat. Protection of PCAs allows for the future expansion of species into areas that are currently unoccupied, but are considered to represent suitable habitat due to its historical occurrence (Pima County 2001a). High priority areas for habitat restoration and for connectivity were included in PCAs for some species, where taxonomic experts defined them. Herein, “habitat” refers to either PCAs (all but two species) or modeled habitat (two species).

Habitat loss due to development-related activities was not modeled for the 12 species of talussnails because information is insufficient for a reliable take analysis for these species. For talussnails, Fonseca (2009) provided a narrative of the few instances where these species might be impacted. These included land disturbances at a single planned development and land disturbances related to activities such as trail construction.

As shown in Table 4.5, there is a notable difference between the amount of Covered Species habitat in the existing built environment (which also includes habitat for some Covered Species) and the amount of projected habitat loss over the 30-year permit period. Nearly one-quarter of the Covered Species have approximately 10 percent of the habitat within the existing built environment, with a particularly high percentage of habitat

**TABLE 4.5
EXISTING AND PROJECTED IMPACTS TO COVERED SPECIES' HABITAT**

Species	Total Habitat (acres)	Existing Built (acres)	% of Habitat in Existing Built	Total Projected Impacts in Permit Area	Total Projected Impacts as % of Habitat
Pima pineapple cactus	581,823	23,405	4	53,166	9
Needle-spined pineapple cactus	44,172	1,741	4	4,676	11
Huachuca water umbel	35,608	2,397	7	3,058	9
Tumamoc globeberry	1,600,041	64,726	4	92,888	6
Mexican long-tongued bat	561,907	7,698	1	21,868	4
Western red bat	512,767	2,772	1	6,158	1
Southern yellow bat	147,749	10,748	7	7,041	5
Lesser long-nosed bat	1,532,724	25,706	2	57,875	4
California leaf-nosed bat	542,813	13,256	2	5,051	1
Pale Townsend's big-eared bat	306,520	6,198	2	13,544	4
Merriam's mouse	119,584	12,394	10	8,165	7
Burrowing owl	216,161	43,283	20	24,644	11
Cactus ferruginous pygmy-owl	1,264,335	99,013	8	67,629	5
Rufous-winged sparrow	893,606	36,653	4	52,567	6
Swainson's hawk	923,310	14,301	2	31,225	3
Western yellow-billed cuckoo	56,990	8,080	14	2,086	4
Southwestern willow flycatcher	14,364	477	3	0	0
Abert's towhee	78,081	7,222	9	4,713	6
Bell's vireo	63,672	8,015	13	3,856	6
Longfin dace	19,853	179	1	440	2
Desert sucker	9,167	135	1	0	0
Sonora sucker	10,492	699	7	179	2
Gila chub	32,225	1,066	3	712	2
Gila topminnow	21,877	273	1	694	3
Chiricahua leopard frog	403,425	2,192	1	2,994	1
Lowland leopard frog	582,906	67,845	12	42,656	7
Desert box turtle	295,202	22,799	8	11,268	4
Desert tortoise (Sonoran population)	1,953,400	27,618	1	43,509	2
Tucson shovel-nosed snake	87,787	4,812	5	2,509	3
Northern Mexican gartersnake	140,702	40,231	29	22,895	16
Giant spotted whiptail	330,917	34,188	10	21,899	7
Groundsnake (valley form)	39,600	3,978	10	5,548	14

Numbers shown reflect projected impacts at the end of the 30-year permit period.

Numbers are in acres unless otherwise noted.

Impacts to Covered Species' habitat are based on Priority Conservation Areas for all species, except the Tumamoc globeberry and Sonoran population of desert tortoise, for which modeled habitat was used.

Species not included because take was not modeled for these species: all talus snails.

in the current built environment for the northern Mexican gartersnake (29 percent), burrowing owl (20 percent), and western yellow-billed cuckoo (14 percent). For the northern Mexican gartersnake and western yellow-billed cuckoo, these numbers represent historical habitat loss and the overly broad envelope enclosing potentially suitable habitat. For burrowing owl, areas of habitat loss do not represent the current distribution of species because the PCAs were created to represent the best occupied or potential habitat for each species as of 1999. In addition, activities within the built environment may have contributed to the suitability of habitat for this species. As a result, the current distribution of occupied habitat within the built environment is likely much lower than shown in Table 4.5 and the distribution of historical occurrence would, for most species, be underestimated.

Much of the PCA for any given species is currently unoccupied habitat that has been degraded by past and ongoing activities. Projected development is anticipated to result in loss of less than 5 percent of habitat for 20 of the 34 species in Table 4.5. Projected habitat loss would be greatest for the northern Mexican gartersnake (16 percent), groundsnake (14 percent), and burrowing owl (11 percent). No habitat loss is predicted to occur for the southwestern willow flycatcher or desert sucker. When combining the existing built environment and projected growth over the next 30 years, habitat loss is greatest for the Mexican gartersnake (45 percent), burrowing owl (31 percent), and groundsnake (24 percent). Pima County is proposing mitigation for impacts to these species in the form of conservation lands ranging from a ratio of 2 acres of mitigation for every acre of impact to the burrowing owl to 83 acres of mitigation for every acre of impact to the groundsnake.

Table 4.6 summarizes the projected impacts to Covered Species' habitat by jurisdiction and shows that only three species have greater than 50-percent habitat loss outside of the Permit Area (Huachuca water umbel, desert box turtle, and groundsnake). The extreme case in this regard is for the groundsnake, for which 91 percent of the impacts to its habitat are expected to occur in the Town of Marana. The Huachuca water umbel and the desert box turtle are the only two species for which impacts would be greater in a single jurisdiction outside of the Permit Area.

Numbers shown for Pima County in Table 4.6 include lands owned by Pima County that are within other jurisdictions. Table 4.6 shows that much of the habitat loss for Covered Species would likely occur within the Permit Area.

No habitat impacts for the Tucson shovel-nosed snake were projected to occur within the City of Tucson or Town of Marana. This projection varies from the amount of habitat loss estimated for this species by the Town of Marana, which projected approximately 4,000 acres of habitat loss for the species (RECON 2009). This difference stems from differing assumptions used in projecting growth and its spatial distribution.

**TABLE 4.6
PROJECTED IMPACTS TO COVERED SPECIES' HABITAT (ACRES) BY JURISDICTION**

Species	Impacts by Jurisdiction (acres)						Total Impacts	
	Marana	Oro Valley	Sahuarita	South Tucson	Tucson	Pima County Permit Area ^a	Acres	% of Total in Permit Area
Pima pineapple cactus	0	0	4,416	0	7,367	40,935	53,292	77
Needle-spined pineapple cactus	0	0	0	0	0	4,676	4,676	100
Huachuca water umbel	1,552	0	0	0	31	1,476	3,058	48
Tumamoc globeberry	8,474	3,181	9,397	3	15,391	54,617	92,888	59
Mexican long-tongued bat	0	0	0	0	1,132	20,706	21,868	95
Western red bat	194	0	0	0	0	5,846	6,158	95
Southern yellow bat	0	0	0	0	289	6,742	7,041	96
Lesser long-nosed bat	0	0	2,121	0	5,251	50,007	57,875	86
California leaf-nosed bat	0	0	0	0	559	3,969	5,051	79
Pale Townsend's big-eared bat	0	0	0	0	192	13,228	13,544	98
Merriam's mouse	0	0	3,439	0	97	4,574	8,165	56
Burrowing owl	8,146	0	831	0	2,295	12,177	23,644	52
Cactus ferruginous pygmy-owl	15,657	7,700	0	0	2,546	41,179	67,629	61
Rufous-winged sparrow	0	4,038	27	0	486	47,769	52,567	91
Swainson's hawk	0	0	0	0	245	30,902	31,225	99
Western yellow-billed cuckoo	0	0	0	0	124	1,950	2,086	94
Southwestern willow flycatcher	0	0	0	0	0	0	0	0
Abert's towhee	1,273	0	408	0	278	2,753	4,713	58
Bell's vireo	0	0	0	0	185	3,658	3,856	95
Longfin dace	0	0	0	0	0	440	440	100
Desert sucker	0	0	0	0	0	0	0	0
Sonora sucker	0	0	0	0	0	179	179	100
Gila chub	0	0	0	0	0	708	712	99
Gila topminnow	0	0	0	0	0	694	694	100
Chiricahua leopard frog	0	0	0	0	0	2,989	2,994	100
Lowland leopard frog	3,833	272	3,268	17	4,166	30,930	42,656	73
Desert box turtle	81	0	5,524	6	1,618	4,020	11,268	36
Desert tortoise (Sonoran population)	2,458	1,656	11	0	6,389	32,372	43,509	74
Tucson shovel-nosed snake	0	0	0	0	0	2,493	2,509	99
Northern Mexican gartersnake	472	0	5,616	11	4,358	12,405	22,895	54
Giant spotted whiptail	102	746	5,427	3	1,504	14,034	21,899	64
Groundsnake (valley form)	5,056	0	0	0	0	492	5,548	9

See notes on next page.

^a Numbers shown for Pima County include: (1) State Trust Lands in unincorporated Pima County that have been planned for development or are expected to be released to development during the course of the permit; and (2) lands within other jurisdictions, but are owned by Pima County.
Area of analysis was for eastern Pima County.
Numbers shown reflect projected impacts at the end of the 30-year permit period.
Numbers are in acres unless otherwise noted.
Impacts to Covered Species' habitat are based on Priority Conservation Areas for all species, except the Tumamoc globeberry and Sonoran population of desert tortoise, for which modeled habitat was used.
Species not included: Take was not modeled for all talus snails.
See the Pima County MSCP for maps of projected take by species.

Most impacts would be the result of non-discretionary activities, as shown in Table 4.7, which summarizes projected impacts for the MSCP action alternatives, amount of impacts attributed to non-discretionary activities, and existing mitigation lands. Over 90 percent of impacts would be from non-discretionary activities for 14 of the 44 Covered Species. Only the Pima pineapple cactus is predicted to have a majority of adverse impacts resulting from discretionary activities.

4.4.4 Critical Habitat

Impacts to USFWS-designated critical habitat were modeled using the same land absorption model used for modeling impacts to the Special Elements, Covered Species' habitat, and CLS. Four Covered Species currently have designated critical habitat within the Permit Area: Huachuca water umbel, southwestern willow flycatcher, Gila chub, and Chiricahua leopard frog. Critical habitat has been proposed for the yellow-billed cuckoo and the northern Mexican gartersnake. Alternative-specific impacts to critical habitat are analyzed in Section 4.4.6.

4.4.5 Maeveen Marie Behan Conservation Lands System

The CLS is the primary conservation element used to estimate impacts and associated mitigation for the alternatives of the Pima County MSCP. Table 4.8 shows projected acres of development impacts by jurisdiction. Sixty-five percent of the projected development in eastern Pima County, approximately 111,000 acres, is expected to occur within the Permit Area. Of this, approximately 30 percent is projected to occur outside of the CLS, and a similar amount is projected to occur in the Biological Core Management Area, 13 percent within the Important Riparian Area, 25 percent in the Multiple Use Management Area, 5 percent in the Special Status Species Management Area, and less than 1 percent in the Agricultural Holdings. Table 4.8 shows the amount of projected impacts within the Permit Area and the corresponding percentage projected to occur within the Permit Area. Ninety-eight percent of the development projected to occur in the Biological Core Management Area would be in the Permit Area, whereas only 6 percent of projected impacts to the Agricultural category would be in the Permit Area. The other CLS categories are intermediate, but the average amount of development across all CLS categories, excluding areas outside the CLS, reveals that most projected impacts would occur in the Permit Area due to the relatively undeveloped nature of lands in unincorporated Pima County.

Table 4.9 shows the acres of mitigation land that Pima County has acquired for conservation purposes in advance of a Section 10(a)(1)(B) permit, as it relates to the CLS. The numbers shown exclude land conserved via Natural Open Space Set-asides. Natural Open Space Set-asides constitute a small number (i.e., <1000 acres) and were not part of the GIS analysis. The current suite of mitigation lands that Pima County has

**TABLE 4.7
PROJECTED IMPACTS AND MITIGATION BY SPECIES (ACRES)**

Species	Habitat Loss by Alternative (Acres)			Mitigation to Date*		
	B	C	D	Fee Title	State Lease	Fee Title plus State Lease Lands
Pima pineapple cactus	399	40,935	18,963	8,943	39,781	48,724
Needle-spined pineapple cactus	0	4,676	852	5,866	11,154	17,020
Huachuca water umbel	364	1,476	364	3,885	684	4,569
Tumamoc globeberry	1,234	54,617	19,434	13,055	32,261	45,316
Mexican long-tongued bat	4	20,706	5,735	37,124	47,899	85,023
Western red bat	9	5,846	178	17,818	12,127	29,945
Southern yellow bat	48	6,742	48	11,941	3,294	15,235
Lesser long-nosed bat	208	50,007	15,978	56,565	106,160	162,725
California leaf-nosed bat	21	3,969	111	9,619	10,332	19,951
Pale Townsend's big-eared bat	17	13,228	1,525	18,994	28,720	47,713
Merriam's mouse	17	4,574	330	8,190	789	8,979
Burrowing owl	840	12,177	1,392	2,879	0	2,879
Cactus ferruginous pygmy-owl	641	41,179	7394	27,561	55,084	82,645
Rufous-winged sparrow	74	47,769	19,108	25,602	44,252	69,854
Swainson's hawk	4	30,902	10,981	30,774	62,202	92,977
Western yellow-billed cuckoo	28	1,959	28	8,621	4,106	12,726
Southwestern willow flycatcher	0	0	0	314	0	314
Abert's towhee	511	2,753	554	9,817	1,471	11,288
Bell's vireo	72	3,658	72	7,521	2,008	9,529
Longfin dace	0	440	0	4,556	1,246	5,803
Desert sucker	0	0	0	99	0	99
Sonora sucker	0	179	0	50	0	50
Gila chub	0	708	0	3,411	490	3,901
Gila topminnow	0	694	0	4,161	1,277	5,438
Chiricahua leopard frog	0	2,989	2	10,175	13,185	23,359
Lowland leopard frog	866	30,930	7,145	31,239	48,701	79,940
Desert box turtle	649	4,020	748	5,496	80	5,576
Desert tortoise (Sonoran population)	231	32,372	9,473	37,059	55,043	92,102
Tucson shovel-nosed snake	0	2,493	63	1,275	0	1,275
Northern Mexican gartersnake	904	12,405	3,210	10,367	1,856	12,223
Giant spotted whiptail	703	14,034	4,355	10,311	4,529	14,840
Groundsnake (valley form)	11	492	11	915	0	915

See notes on next page.

* The acreage reported for State land leases is for a 100 percent credit rate.
Numbers shown reflect projected impacts at the end of the 30-year permit period.
Numbers are in acres unless otherwise noted.
Impacts to Covered Species' habitat is based on Priority Conservation Areas for all species except the Tumamoc globeberry and Sonoran population of desert tortoise, for which modeled habitat was used.
Numbers shown for mitigation to date is based on the current suite of mitigation lands. Mitigation acres are acquisitions as of December 2009 and do not include future acquisitions nor natural open-space set-asides by the private sector that would add additional acres for most species.
Species not included because take was not modeled for these species: all talus snails.
See Pima County MSCP for maps of projected take by species.

**TABLE 4.8
PROJECTED IMPACTS TO CLS BY JURISDICTION (ACRES)**

CLS Category	Projected Impact by Jurisdiction (acres)						Projected Impacts: Permit Area ^a		Impact as % of total MMB- CLS
	Marana	Oro Valley	Sahuarita	South Tucson	Tucson	Pima County ^b	Total (acres)	% in Pima County Permit Area	
Biological Core Management Area	331	139	0	0	29	34,302	34,793	98	4
Important Riparian Area	2,226	468	283	0	405	8,263	11,775	70	7
Multiple Use Management Area	2,708	4,624	2,652	0	924	26,012	37,505	69	4
Special Species Management Area	8,488	818	0	0	0	7,541	16,965	44	2
Agricultural Inholdings	100	0	1,580	0	0	113	1,793	6	19
Outside of CLS	4,281	1,716	5,306	68	21,576	35,202	69,771	50	15
Total	18,135	7,765	9,821	68	22,934	111,433	172,788		

CLS = Maeveen Marie Behan Conservation Lands System

^a The number of acres in the Permit Area is the sum of all the acres of the projected impacts in the jurisdiction plus the area of County CIP projects and some State lands that are outside the County's Permit Area.

^b Includes lands currently owned by the State of Arizona and within unincorporated Pima County that have been planned for development or are expected to be released to development during the course of the permit. Also includes lands within other incorporated jurisdictions that are owned by Pima County.

Numbers are in acres unless otherwise noted.

**TABLE 4.9
COUNTY-CONTROLLED MITIGATION LANDS (EXISTING ACRES)**

Relationship to CLS	CLS Category	Fee Title	State Trust Land ^a	Total Acres
Inside CLS	Biological Core Management Area	32,018	49,331	81,349
	Important Riparian Area	11,265	2,859	14,124
	Multiple Use Management Area	25,053	33,179	58,232
	Special Species Management Area	4,339	28,284	32,623
	Agriculture Inholdings	17	0	17
	CLS Total	72,693	113,653	186,346
Outside CLS		906	324	1,230
Outside Pima County ^b		1,570	10,915	12,484
Total (Inside CLS + Outside CLS)		75,169	124,892	200,060

CLS = Maeveen Marie Behan Conservation Lands System

Numbers shown exclude land conserved via natural open space set-asides.

a Pima County seeks partial mitigation credit for County-leased State Lands.

b Lands outside of Pima County are associated with the A7 Ranch (168 acres of fee title lands and 9,630 acres of leased lands), Tortolita Mountain Park (796 acres of fee title lands) and 722 acres of fee-title lands, acquisition of which is being sought by Pima County from the BLM in accordance with the DOI Recreation and Public Purposes Act.

acquired through fee-title acquisition or lease include approximately 75,000 fee-title acres and 125,000 acres of State Trust Lands. Pima County refers to these fee-title and County-leased State Trust Lands as the County-controlled mitigation lands. Over 98 percent of these lands are inside the CLS. Forty percent (approximately 81,000 acres) of the County-controlled mitigation lands are in the Biological Core Management Area category and 29 percent (approximately 58,000 acres) of these lands are in the Multiple Use Management Area category.

4.4.6 Comparison of Alternatives

Future development in the Pima County MSCP Permit Area would result in significant impacts to three key conservation targets identified by Pima County: the Special Elements, Covered Species, and the CLS. The location and severity of impacts to these resources would be determined by local economic and social forces, not by project alternatives. A majority of impacts to the three conservation targets would come from development-related activities in the Pima County Permit Area.

The greater impacts within the Permit Area for most of the conservation targets outlined in this section can be attributed to the character of the Permit Area, which represents much of the exurban, undeveloped, and unprotected land in Pima County. By contrast, many areas outside of the Permit Area (and exclusive of Federal and Tribal ownership) are within the incorporated jurisdictions of Pima County, have existing development, and much of the natural character of these lands has already been lost.

Development activity within Pima County is likely to occur regardless of which alternative is selected or whether an incidental take permit is issued. Because there is no functional difference among action alternatives regarding the projected loss of conservation targets to development-related activities in eastern Pima County, the key differences among alternatives are in the mitigation, management, and monitoring requirements that Pima County would undertake under the Section 10(a)(1)(B) permit. Those differences are discussed below.

Because the CLS is the primary mitigation accounting tool for projected impacts under the Pima County MSCP, the mitigation commitments under each of the action alternatives are the most important and distinguishing feature of the action alternatives versus the No Action Alternative. The number of acres of mitigation would depend on the footprint of the impacts and where the impacts occur. Mitigation ratios reflect the relative biological importance of each of the CLS categories. The following mitigation ratios (acres conserved to acres impacted) would be used for Alternatives B and D:

- Biological Core Management Area—5:1
- Multiple Use Management Area—3:1
- Important Riparian Area—5:1
- Special Species Management Area—5:1

- Agricultural—2:1
- Outside of the CLS (excluding agricultural lands)—2:1

For Alternative C, the SDCP mitigation ratios, which are applied to private development at the time of rezoning, would be used:

- Biological Core Management Area—4:1
- Multiple Use Management Area—2:1
- Important Riparian Area—4:1
- Special Species Management Area—4:1
- Agricultural—none
- Outside of the CLS (excluding agricultural lands)—none

The impact analysis for all alternatives overestimates the future impacts to Important Riparian Areas. Actual future impacts would be less than shown in Table 4.10. This is because the riparian habitat provision of the Pima County RFCD's Floodplain Ordinance triggers impact evaluation when proposed project disturbances are greater than a third of an acre; projects disturbing larger areas than that would have to demonstrate that no practical alternative could be found and that impacts to vegetation would be mitigated. Also, Pima County's site analysis would likely continue to require additional riparian conservation measures from rezoning requests.

TABLE 4.10
PROJECTED IMPACTS TO SPECIAL ELEMENTS WITHIN THE PERMIT AREA (ACRES)

Special Element	Alternative (Acres)		
	B	C	D
Cattail	0	0	0
Cottonwood-Willow	39	70	39
Creosote-Bursage	29	1,121	23
Douglas Fir-Mixed Conifer	0	0	0
Unincised Floodplain	0	0	0
Interior Southwest Riparian Deciduous Forest	0	231	0
Intermittent Streams with 300-foot Buffer	90	767	94
Ironwood	93	5,349	141
Limestone Outcrop	0	2,170	91
Mesquite Bosque	27	1,623	350
Native Upland Grassland	1	3,146	690
Oak Scrub Grassland Ecotone	0	770	0
Perennial Streams with 300-foot Buffer	190	218	190
Palo Verde-Mixed Cactus	991	52,117	16,286
Sacaton Grasslands	0	0	0
Saltbush	14	332	99
Springs with 300-foot Buffer	3	28	3
Sonoran Riparian Scrub	425	11,893	3,767
Talus and Colluvium	0	14	14
Talus Slopes	0	363	0
Low Elevation Valley Floors (<2,500 feet)	484	7,823	1,792
Total	2,386	88,035	23,579

Numbers shown reflect projected impacts at the end of the 30-year permit period.
 Acres of impact from the No Action Alternative are the same as for Alternative C.
 Numbers are in acres unless otherwise noted.

4.4.6.1 No Action Alternative

Under the No Action Alternative, Pima County would not apply for a Section 10(a)(1)(B) permit and ESA compliance would continue on a project-by-project basis, as required, and no large-scale conservation effort would be undertaken. Land and infrastructure development, and building by the public and private sectors, would continue as projected.

Without a Section 10(a)(1)(B) permit, incidental take of species currently listed or listed in the future would have to be avoided or dealt with on a case-by-case basis, either through small-scale habitat conservation plans for private, non-Federal actions, or through Section 7 consultations for actions with a Federal nexus. These case-by-case solutions would not benefit from a coordinated and directed mitigation program. Because of these factors, the No Action Alternative may result in development within lands that would otherwise be set aside as mitigation lands (under the action alternatives).

Under the No Action Alternative, approximately 88,035 acres of habitat for Special Elements would be adversely impacted over the 30-year permit period, as described in

Table 4.10 (the No Action Alternative would have the same impacts as Alternative C). The majority of impacts would be caused by non-discretionary activities (activities for which Pima County has no regulatory control).

There would be a greater chance for degradation of conservation targets (Special Elements, Covered Species, and CLS) over time under the No Action Alternative than under the action alternatives. Without a Section 10(a)(1)(B) permit there would not be the regulatory requirements for many of the management, monitoring, and species-specific conservation commitments proposed by the action alternatives. Most importantly, the No Action Alternative would lack a mandate for land conservation in perpetuity through the use of conservation easements, which would have the effect of permanently prohibiting and/or severely restricting development on County-controlled properties. Additionally, there would also be no legally binding assurances that management activities of long-term benefit to biological resources would be developed or implemented. For these reasons the No Action Alternative could result in long-term indirect adverse effects on biological resources.

Under the No Action Alternative, Pima County-managed ranches would continue to be managed as they are currently. Ranch management plans would be developed as currently required. Infrastructure improvements would be included in the ranch management plans, which will continue to be available to the public for review and comment.

Beneficial effects would continue to accrue assuming the continuance of Pima County's application of a host of tools such as CLS set-aside guidelines during the rezoning process, purchase and management of open space to fulfill SDCP goals, and purchasing of water rights to promote in-stream flow at select sites.

The No Action Alternative would likely result in adverse effects from continued land and infrastructure development, either directly or through habitat modifications, on wildlife and plants in general, including Covered Species, Federal or State species, and migratory birds. These impacts would be addressed on a case-by-case basis either through small-scale habitat conservation plans for private, non-Federal actions, or through Section 7 consultations with a Federal nexus. The No Action Alternative may result in a higher level of interference to the movement of native wildlife species or impede the use of wildlife linkages and promote the introduction or spread of invasive or non-native species. These impacts would also be addressed on a case-by-case basis, as required by Federal, State, and County regulations.

4.4.6.2 Alternative B

Under Alternative B, a Section 10(a)(1)(B) permit would be issued for coverage of 44 species that would apply to activities Pima County undertakes, such as construction, maintenance, ranch infrastructure improvements, and management by Pima County

departments as part of the Capital Improvement Program (see Figure 4.2). Conditions of the Section 10(a)(1)(B) permit for the mitigation of effects to federally listed species would require the mitigation and conservation of biological resources for those activities covered under the permit that result in impacts. Under Alternative B, between 2,000 and 5,000 acres of CLS lands could be impacted by Covered Activities (see Table 4.2). Most of the covered impacts would occur within the existing built environment (see Figure 4.2), and mitigation would take place primarily within the CLS. Based on the current CLS mitigation ratios and potential future growth, Pima County would be responsible for the permanent protection of approximately 16,000 acres (see Table 4.2). This would be achieved with a subset of the County-owned fee lands that have already been acquired for conservation purposes (see Table 4.9).

Under Alternative B, approximately 2,386 acres of Special Elements would be impacted over the 30-year permit period, as described in Table 4.10. The majority of impacts would be caused by non-discretionary activities (activities for which Pima County has no regulatory control). Impacts to Special Elements are the lowest under Alternative B as compared to the No Action Alternative and Alternatives C and D.

Projected impacts (acres of habitat loss) to Covered Species under the Alternative B Section 10(a)(1)(B) permit Covered Activities are shown in Table 4.7. The mitigation ratio (acres impacted to acres conserved) of at least 1:1 would be provided for all Covered Species under Alternative B counting only fee-titled lands for mitigation.

Under Alternative B, approximately 7.4 acres of proposed critical habitat for the acuña cactus would be potentially impacted. Designated critical habitat found within the Permit Area for the Mexican spotted owl, jaguar, southwestern willow flycatcher, and Gila chub would not be impacted under Alternative B.

Under Alternative B, the required management and monitoring program would be restricted to a relatively small subset of the mitigation lands (i.e., up to 16,000 acres; see Table 4.2). The management program would focus on the eradication of invasive species in areas of ground-disturbing Capital Improvement Programs and the continuation of the ranch management program.

Under this alternative, monitoring would be considerably more constrained than the program proposed under Alternative D. The primary focus of monitoring under this alternative would be for a host of Covered Species, as with Alternative D, but exclude the cactus ferruginous pygmy-owl, Sonoran population of the desert tortoise, and most bats. Under this alternative, Pima County would monitor other Covered Species and landscape-change parameters such as fragmentation and cover-type conversion; however, monitoring of threats, habitat, and climate would not occur.

Under Alternative B, the issuance of the Section 10(a)(1)(B) permit for Covered Activities would have an adverse effect, either directly or through habitat modifications, on

Covered Species, as detailed above. These impacts would be addressed through mitigation lands, as detailed in Table 4.2, as well as a management and monitoring program. Alternative B is not likely to interfere with the movement of native wildlife species or impede the use of wildlife linkages. Alternative B may promote the introduction or spread of invasive or non-native species. These impacts would also be addressed under the management and monitoring program outlined for Alternative B.

4.4.6.3 Alternative C

Under Alternative C, a Section 10(a)(1)(B) permit would be issued for coverage of 44 species that would apply to activities Pima County undertakes, such as construction, maintenance, ranch infrastructure improvements, and management by Pima County departments. The permit would also include all private development within unincorporated Pima County for which the County issues a permit (all discretionary and non-discretionary permits issued by Pima County to the private sector; see Figure 4.3). Conditions of the Section 10(a)(1)(B) permit would require the mitigation and conservation of biological resources for those activities covered under the permit that result in impacts.

A Section 10(a)(1)(B) permit for Alternative C would provide coverage for the largest number of acres of development-related impacts (see Figure 4.3). Under Alternative C, 111,433 acres of CLS lands would be impacted by Covered Activities (see Table 4.2). Most of the covered impacts would occur within the existing built environment (see Figure 4.3), and mitigation would take place primarily within the CLS. Based on the MSCP mitigation ratios and the projected location of Covered Activities under this alternative, the amount of land that would be required for permanent protection would be approximately 252,000 acres (see Table 4.2). This would not be achieved with the County-owned fee lands that have already been acquired for conservation purposes (see Table 4.9). Pima County has proposed a 25-percent mitigation credit for their leased State Trust Lands. If the Section 10(a)(1)(B) permit is approved, those associated acres would bring the total number of County-controlled mitigation lands to approximately 110,000 acres (see Table 4.9). Approximately 142,000 acres of mitigation lands would still be needed under Alternative C.

As part of the increased mitigation lands (purchase of lands) required for mitigation, under Alternative C, Pima County would also need to increase the restoration program of these additional lands. Under the restoration program, management actions (e.g., arroyo restoration and reducing shrub encroachment in grasslands) and monitoring activities would likely be employed in an adaptive management framework. Alternative C would also likely require additional enforcement, management, and monitoring resources (i.e., number of visits, sites, actions), as well as sampling sites to ensure mitigation of impacts from Covered Activities.

The majority of impacts would be caused by non-discretionary activities (activities for which Pima County has no regulatory control). Impacts to Special Elements are the highest under Alternative C as compared to the No Action Alternative and Alternatives B and D.

Projected impacts (acres of habitat loss) to Covered Species under the Alternative C Section 10(a)(1)(B) permit Covered Activities are shown in Table 4.7. Under Alternative C, a mitigation ratio (acres impacted to acres conserved) of at least 1:1 would be achieved for approximately 85 percent of the Covered Species counting only fee-title mitigation lands.

Under Alternative C, a total of 33 acres of Gila chub designated critical habitat would potentially be impacted as a result of Covered Activities (ground-disturbing activities) in the Permit Area. All impacts would result from non-discretionary activities under Alternative C.

Approximately 868 acres of Mexican spotted owl designated critical habitat would potentially be impacted as a result of Covered Activities (ground-disturbing activities) in the Permit Area. All but 1.6 acres of potential impacts would result from non-discretionary activities covered under Alternative C.

Alternative C would result in potential impacts to 4,132 acres of proposed critical habitat for the jaguar, 7.4 acres of proposed critical habitat for the acuña cactus and 24 acres of proposed critical habitat for the yellow-billed cuckoo. Designated critical habitat found within the Permit Area for the southwestern willow flycatcher, northern Mexican gartersnake, and Chiricahua leopard frog would not be impacted under Alternative C.

The primary difference between Alternatives C and D is the inclusion of all non-discretionary activities under Alternative C. Impacts from non-discretionary activities would account for greater than 75 percent of impacts for the Biological Core Management Area and Special Species Management Areas. Under Alternative C, the issuance of the Section 10(a)(1)(B) permit for Covered Activities would have an adverse effect, either directly or through habitat modifications, on Covered Species, as detailed above. These impacts would be addressed through mitigation lands as detailed in Table 4.2, as well as a management and monitoring program. Alternative C may interfere with the movement of native wildlife species or impede the use of wildlife linkages. Alternative C may also promote the introduction or spread of invasive or non-native species. These impacts would also be addressed under the management and monitoring program outlined for Alternative C.

4.4.6.4 Alternative D (Preferred Alternative)

Under Alternative D, a Section 10(a)(1)(B) permit would be issued for coverage of 44 species that would apply to activities Pima County undertakes, such as construction,

maintenance, ranch infrastructure improvements, and management by Pima County departments and would also include some private properties (see Figure 4.4). Conditions of the Section 10(a)(1)(B) permit would require the mitigation and conservation of biological resources for those activities covered under the permit that result in impacts.

A Section 10(a)(1)(B) permit for Alternative D would provide coverage for up to 36,000 acres of development-related impacts to the CLS (see Table 4.2 and Figure 4.4). Most of the covered impacts would occur within the existing built environment (see Figure 4.4), and mitigation would take place primarily within the CLS. Based on the CLS mitigation ratios and the potential location of Covered Activities under this alternative, the amount of land that would be required for permanent protection would be up to approximately 116,000 acres (see Table 4.2). This mitigation requirement would almost be achieved with the current County-owned and County-leased lands (see Table 4.9), under the assumption that Pima County receives 25-percent mitigation credit for their leased State Trust Lands.

Under Alternative D, Pima County may choose to increase the restoration program to gain additional mitigation credit. Under the restoration program, management actions (e.g., arroyo restoration and reducing shrub encroachment in grasslands) and monitoring activities would likely be employed in an adaptive management framework. Alternative D would also likely require enforcement, management, and monitoring resources (i.e., number of visits, sites, actions) to ensure mitigation of impacts from Covered Activities. As it relates to the monitoring program, it is unlikely that additional monitoring parameters (as compared to Alternative C) would be necessary; however, Pima County has stated that sampling sites would be increased under this alternative.

Impacts to Special Elements under Alternative D are lower than those projected under Alternative C and higher than those under Alternative B. Projected impacts (acres of habitat loss) to Covered Species under the Alternative D Section 10(a)(1)(B) permit Covered Activities are shown in Table 4.7. Under Alternative D, a mitigation ratio of at least 1:1 has been achieved for all but three species (Tumamoc globeberry, Pima pineapple cactus, and Sonoran sucker).

Under Alternative D, 0.1 acres of potential impacts to designated Mexican spotted owl critical habitat may result from Covered Activities (ground-disturbing activities) in the Permit Area. Covered Activities may impact 3,210 acres of proposed critical habitat for the northern Mexican gartersnake. Also, approximately 1 acre of Gila chub critical habitat, 7 acres of proposed critical habitat for the acuña cactus, and 265 acres of proposed critical habitat for the jaguar may also be impacted under this alternative.

Under Alternative D, the issuance of the Section 10(a)(1)(B) permit for Covered Activities would have an adverse effect, either directly or through habitat modifications, on Covered Species, as detailed above. These impacts would be addressed through

mitigation lands, as detailed in Table 4.2, as well as a management and monitoring program. Alternative D may interfere with the movement of native wildlife species or impede the use of wildlife linkages; however, these impacts would be minimal. Alternative D may also promote the introduction or spread of invasive or non-native species. These impacts would also be addressed under the management and monitoring program outlined for Alternative D.

4.5 Visual and Scenic Resources

4.5.1 Criterion for Determining Significance

The following criterion was used to determine significance of impacts of alternatives on visual and scenic resources: impacts would be significant if implementation would result in an overall change or degradation in the visual character of scenic highways or scenic vistas.

4.5.2 No Action Alternative

Under the No Action Alternative, Pima County would not apply for a Section 10(a)(1)(B) permit and ESA compliance would continue on a project-by-project basis, as required. Land and infrastructure development, and building by the public and private sectors, would continue as projected. Under this alternative, impacts to visual and scenic resources would continue to be analyzed on a case-by-case basis, depending on the project and permitting requirements.

The No Action Alternative would be the least able of all the alternatives to support the protection of Pima County's scenic resources in the long term. This alternative would provide no permanent assurances that future Pima County decisions related to development would not undo existing and future land acquisition commitments to protect undeveloped land from future development. The No Action Alternative would not include the legally binding commitments of the action alternatives, and no large-scale, permanent framework for land conservation would exist.

Under the No Action Alternative, visual quality and scenic vistas would likely be increasingly vulnerable to degradation due to loss of what are considered Pima County's primary scenic resources: views of undeveloped open space, native vegetation, natural terrain, and unaltered watercourses.

Under the No Action Alternative, Pima County would continue to implement elements of the SDCP and continue to use the CLS and other conservation measures to achieve conservation of natural and cultural resources. Beneficial effects of conserving intact landscape elements and forms under the SDCP, and thereby avoiding or minimizing impacts to the visual environment, would likely continue to accrue under the No Action Alternative.

Overall, the No Action Alternative may result in a change or degradation of some visual character or scenic vistas. Conservation of open space, and therefore scenic vistas, would also likely continue; however, legally binding commitments may be absent.

4.5.3 Alternatives B, C, and D

Under Alternatives B, C, and D, a Section 10(a)(1)(B) permit would be issued for proposed Covered Activities (that vary by alternative). Most Covered Activities (ground disturbance and construction) would occur within the existing built environment, minimizing the potential adverse impacts to visual quality. All action alternatives require measures to mitigate the impacts to Covered Species that include the permanent protection of open space lands to mitigate Covered Activity impacts.

The action alternatives would result in beneficial effects to visual and scenic resources by supporting the protection of Pima County's visual quality through Pima County-established programs and policies for the permanent protection of undisturbed open space. The amount of open-space protection through use of conservation easements would vary by alternative, from the most protection under Alternative C to the least amount of protection under Alternative B, as detailed in Section 4.4 above.

Beneficial effects of conserving intact landscape elements and forms, and thereby avoiding or minimizing impacts to the visual environment would accrue under all action alternatives. Overall, Alternatives B, C, and D would not likely result in a change or degradation of visual character or scenic vistas within the Permit Area.

4.6 Air Quality

4.6.1 Criterion for Determining Significance

The following criterion was used for determining significance of impacts of alternatives on air quality: impacts would be significant if implementation would result in noncompliance with Federal air quality standards.

4.6.2 No Action Alternative

Under the No Action Alternative, Pima County would not apply for a Section 10(a)(1)(B) permit and ESA compliance would continue on a project-by-project basis, as required. Land and infrastructure development, and building by the public and private sectors, would continue as projected. Under this alternative, impacts to air quality would continue to be analyzed on a case-by-case basis, depending on the project and permitting requirements.

Under the No Action Alternative, Pima County would likely continue to implement elements of the SDCP and continue to use the CLS and other conservation measures to

maintain air quality. No adverse impacts to air quality would result from implementing the No Action Alternative beyond current levels and predicted future air quality issues. Air quality would continue to be a concern for the metropolitan Tucson area as population growth, land development, and increased vehicular travel (increased drive times) would occur under all alternatives. However, these increases in air quality concerns would not be triggered by the No Action Alternative.

The No Action Alternative would provide as much protection as the action alternatives for regional air quality because of the application of certain Pima County conservation tools would occur regardless of the alternative selected; most notably a more compact urban form through the encouragement of development to occur outside of the CLS. By focusing growth and infrastructure development in urban areas, Pima County would likely reduce vehicular travel time and provide alternative, less polluting means of transportation. The SDCP, the basis of the No Action Alternative, also provides a framework to promote the *Eastern Pima County Trails System Master Plan* by protecting an interconnected system of watercourses, which coincides with a major portion of the regional trails network. An interconnected trails network would promote alternative means of transportation, such as biking and walking, which would likely result in reduced air pollution.

The No Action Alternative is not likely to result in Pima County's noncompliance with Federal air quality standards.

4.6.3 Alternatives B, C, and D

Under Alternatives B, C, and D, a Section 10(a)(1)(B) permit would be issued for proposed Covered Activities (that vary by alternative). Covered Activities include ground disturbance and development, which would result in potential impacts to air quality. Conditions of the Section 10(a)(1)(B) permit would require the mitigation for impacts to Covered Species from Covered Activities. These mitigation and conservation requirements would also benefit air quality. No adverse impacts to air quality are expected as a result of implementing Alternatives B, C, or D. Air quality would continue to be a concern for the metropolitan Tucson area as population growth, land development, and increased vehicular travel would occur under all alternatives. However, these increases in air quality concerns would not be triggered by implementation of any of the alternatives. The action alternatives would have the same effect as the No Action Alternative, except for the aspect of conservation through use of conservation easements and the resulting long-term conservation of large blocks of open space in outlying areas. Alternatives B, C, and D are not likely to result in Pima County's noncompliance with Federal air quality standards.

4.7 Climate Change

4.7.1 Criterion for Determining Significance

The following criterion was used for determining significance of impacts of alternatives on climate change: impacts would be significant if implementation would result in a significant increase or decrease in long-term levels of GHGs and the potential resulting effects on global climate change.

4.7.2 No Action Alternative

Under the No Action Alternative, Pima County would not apply for a Section 10(a)(1)(B) permit and ESA compliance would continue on a project-by-project basis, as required. Land and infrastructure development, and building by the public and private sectors would continue as projected. Under this alternative, impacts to climate change would continue to be analyzed on a case-by-case basis, depending on the project and permitting requirements.

Under the No Action Alternative, Pima County would continue to implement elements of the SDCP and continue to use the CLS and other conservation measures to maintain air quality and reduce GHG emissions. Minimal adverse impacts to climate change would result from implementing the No Action Alternative beyond current levels and predicted future greenhouse gas issues. GHG emission levels would continue to be a concern for the metropolitan Tucson area as population growth, land development, and increased vehicular travel (increased drive times) would occur under all alternatives.

The No Action Alternative would provide as much protection as the action alternatives for climate change-related GHG emissions because of the application of Pima County conservation tools, most notably Pima County's Sustainable Action Plan for County Operations and a more compact urban form through the encouragement of development to occur outside of the CLS. By focusing growth and infrastructure development in urban areas, the City of Tucson and Regional Transportation Authority transportation plans would likely reduce vehicular travel time and provide alternative, less polluting means of transportation, including light rail, increased bike paths, and bus routes.

The No Action Alternative is not likely to result in a significant increase in GHGs within Pima County.

4.7.3 Alternatives B, C, and D

Under Alternatives B, C, and D, a Section 10(a)(1)(B) permit would be issued for proposed Covered Activities (that vary by alternative). Covered Activities include ground disturbance and development, which would result in potential increases in GHG

emissions. Conditions of the Section 10(a)(1)(B) permit would require the mitigation of impacts to Covered Species from Covered Activities.

Impacts of Alternatives B, C, or D on climate change would be relatively minor given the global scale of the climate change problem and the relatively minor spatial and regulatory scale of the Pima County MSCP. However, the impact of implementing any of the action alternatives would have a mitigating impact on climate change and the natural resources that are expected to be impacted. Under Alternatives B, C, or D, the following actions would result in beneficial impacts to climate change, including:

- Acquisition of fee-owned lands and leased lands that would be maintained in a condition that allow for natural processes such as species migration, groundwater recharge, and carbon sequestration
- Implementation of the CLS, which allows for local mitigation of the heat-island effect that could impact Covered Species
- Permanent protection of ecological refugia such as riparian areas, talus slopes, and limestone outcrops
- Incentives for restoration and conservation efforts such as protection of groundwater rights and spring restoration efforts that would help mitigate for climate impacts to species and their habitats

Because of the importance of climate to natural resources, from rangeland conditions to water for wildlife, Pima County has proposed a responsive management program, which is compatible with the USFWS's draft strategic plan for climate change. Pima County's responsive management program would be based on data generated by an effectiveness monitoring program under all action alternatives, which would assist with the management of these resources. The effectiveness monitoring program, which tracks the effectiveness of measures and actions implemented as part of the MSCP in meeting the objectives of the MSCP, would not be a component of the No Action Alternative. The absence of such a program under the No Action Alternative precludes the organizational framework and long-term management strategies that Alternatives B, C, or D would establish and implement. Annual monitoring of ranch lands for utilization and stocking rate adjustments would be undertaken under all alternatives as part of the SDCP.

To minimize the potential adverse effects of climatic variability on their habitat conservation efforts, Pima County incorporated the following ecosystem protection and management principles in the development of the CLS:

- Keep ecosystems within the CLS as intact and functioning as possible by addressing existing threats to the maximum extent practicable. Maintain or improve ecosystem structures and functions to increase the resiliency of ecosystems.
- Increase redundancy of representative habitats by preserving and rehabilitating multiple sites in the CLS.
- Represent species and special elements across environmental gradients, allowing the distribution of species to shift up or down in elevation within a watershed by maintaining corridors for movement.
- Protect climatic refugia, such as groundwater-dependent ecosystems, limestone outcrops, and talus slopes at multiple scales. The inventory and monitoring of special elements and other refugia sites at a scale finer than the CLS would be a part of property-specific management plans.
- Implement and evaluate impact minimization techniques as far in advance of incidental take of listed species and other impacts as possible, and prepare contingency plans for mid-course corrections. This would allow a greater opportunity to make adjustments in management as necessary and feasible.
- Monitor climatic variables. Collect and review precipitation, stream flow, and temperature data to support the interpretation of biological data for the *Monitoring and Adaptive Management Plan*.
- Incorporate research on biotic and abiotic responses to climatic change. On-going regional climate change studies would inform decisions critical to the conservation value of the CLS.
- Restore floodplain hydraulics to store water and reduce the destructive impacts of flood waters during climatic extremes. Specific strategies would include improving rangeland condition, maintaining floodplain dynamics, and restoring degraded and channelized washes.
- Acquire surface and groundwater rights to maintain instream flow for aquatic and riparian habitats and facilitate groundwater recharge.

Other management strategies that Pima County may use to minimize the effects of climate variability on ranch lands under all alternatives include restoring fire as an ecological process in select areas, establishing livestock grass banks to allow greater flexibility in grazing patterns during drought cycles, and deferring grazing.

Alternatives B, C, and D are not likely to result in a significant increase in GHG emissions.

4.8 Urban Land Use

4.8.1 Criteria for Determining Significance

The criteria for determining significance of impacts of alternatives on urban land use are outlined below. Impacts would be significant if implementation would:

- substantially restrict or alter population trends or distribution within the urban area; or
- substantially restrict or alter urban land use patterns.

4.8.2 No Action Alternative

Under the No Action Alternative, Pima County would not apply for a Section 10(a)(1)(B) permit and ESA compliance would continue on a project-by-project basis, as required. Land and infrastructure development, and building by the public and private sectors, would continue as projected. Under this alternative, impacts to urban land use would continue to be analyzed on a case-by-case basis, depending on the project and permitting requirements.

Pima County's planning efforts for land use and for biological conservation have been concurrent processes that are mutually supportive. The CLS developed under the SDCP has been integrated into Pima County's Comprehensive Land Use Plan and serves to define the urban boundaries. However, the No Action Alternative would be the least able of all the alternatives to provide long-term assurances for conservation lands uses on mitigation lands. Without legally binding assurances otherwise, current open-space parcels could be sold for development, thereby potentially triggering the urban land-use planning process. In addition, the Comprehensive Land Use Plan could be changed to allow intensified land development in areas away from the urban core and onto lands within the CLS. The land use pattern under such a scenario would be increasingly fragmented and dispersed, with a weak or undefined urban boundary, with associated problems such as increased drive times and associated air pollution. The No Action Alternative could result in a restriction or alteration of population trends or distribution within Pima County's urban area or alter urban land use patterns. The No Action Alternative would not likely result in reduced land use opportunities for a substantial segment of the population.

4.8.3 Alternatives B, C, and D

Under Alternatives B, C, and D, a Section 10(a)(1)(B) permit would be issued for proposed Covered Activities (that vary by alternative). Most Covered Activities (ground disturbance and construction) would occur within the existing built environment. The CLS developed under the SDCP has been integrated into Pima County's Comprehensive Land Use Plan and serves to define the urban boundaries for all

alternatives. All action alternatives require mitigation measures that include the permanent protection of open space lands to mitigate Covered Activity impacts on Covered Species.

Permanent protection of open-space parcels would support a more compact urban form and boundary, with a few exceptions for parcels that are within the current built environment. The land conservation proposed by the action alternatives would support planned and projected growth areas as identified by Pima County and local jurisdictions. Each of these alternatives, to varying degrees, would retain the availability of adequate land for future development and population growth while accomplishing habitat conservation goals. Because the projected growth and land use in Pima County would be similar regardless of whether an incidental take permit is issued, Covered Activities under Alternatives B, C, and D would not substantially restrict or alter population trends or distribution within the urban area nor substantially restrict or alter land-use patterns. Most significant land use changes are expected to occur outside of the CLS.

4.9 Transportation

4.9.1 Criteria for Determining Significance

The criteria for determining significance of impacts of alternatives on transportation are outlined below. Impacts would be significant if implementation would:

- exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads;
- substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections);
- substantially increase flood hazards;
- result in inadequate emergency access; or
- conflict with adopted policies, plans, or programs supporting alternative transportation.

4.9.2 No Action Alternative

Under the No Action Alternative, Pima County would not apply for a Section 10(a)(1)(B) permit and ESA compliance would continue on a project-by-project basis, as required. Land and infrastructure development, and building by the public and private sectors, would continue as projected. Under this alternative, impacts to transportation would continue to be analyzed on a case-by-case basis, depending on the project and permitting requirements.

The No Action Alternative would not have an adverse effect on transportation, except in those circumstances where a road-building project could be delayed or otherwise

affected because of potential conflicts with federally listed species and ESA compliance. In these cases, consultation with the USFWS would be required, and delays in project implementation could occur. Under the No Action Alternative, existing wildlife crossing structures over or adjacent to roadways would be maintained.

The absence of a large-scale conservation plan, such as the MSCP and approved Section 10(a)(1)(B) permit, may result in alterations or reductions in wildlife corridor structures and linkages under development pressure. Projects in the area with known wildlife corridors and linkages would continue to be analyzed on a case-by-case basis under the No Action Alternative.

Overall, the No Action Alternative would not likely exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads; substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections); substantially increase flood hazards; result in inadequate emergency access; or conflict with adopted policies, plans, or programs supporting alternative transportation. The No Action Alternative may result in alterations or reductions in areas known to have wildlife corridors and linkages.

4.9.3 Alternatives B, C, and D

Under Alternatives B, C, and D, a Section 10(a)(1)(B) permit would be issued for proposed Covered Activities (that vary by alternative). Most Covered Activities (ground disturbance and construction) under the action alternatives would occur within the existing built environment. No Federal, State, or local scenic roads would be adversely affected and none of the action alternatives would conflict with ADOT's transportation planning and construction programs. The action alternatives do not conflict with the Transportation Element of Pima County's Comprehensive Plan or the PAG Regional Transportation Plans for transportation system elements. Through the adoption of the CLS and protection of open space, there would be a more compact urban form, thereby allowing for more efficient and properly maintained transportation infrastructure.

Goals outlined for Alternatives B, C, and D, and Federal transportation programs such as the Transportation Equity Act for the 21st Century, are mutually supportive. For example, recent Transportation Equity Act for the 21st Century funding has been granted to support acquisition of open space adjacent to Interstate 10 in the biologically diverse area of Davidson Canyon. This financial support would aid Pima County's efforts to protect 600 acres that include Important Riparian Areas, and also serve as a critical landscape connection between the Santa Rita Mountains and Saguaro National Park.

Mitigation measures for impacts to Covered Species required under Alternatives B, C, and D would provide an added level of protection to open-space parcels by ensuring long-term protection of lands through the use of conservation easements. This would have the effect of reducing fragmentation and could reduce the number of roads that

would have to be built and maintained thereby concentrating transportation resources in areas of higher use. This would also result in the protection of wildlife corridors and linkages within conservation lands.

Overall, Alternatives B, C, and D would not likely exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads; substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections); substantially increase flood hazards; result in inadequate emergency access; conflict with adopted policies, plans, or programs supporting alternative transportation; or reduce or alter wildlife corridors.

4.10 Ranching and Agriculture

4.10.1 Criterion for Determining Significance

The following criterion was used to determine significance of impacts of alternatives on ranching and agriculture: impacts would be significant if implementation would substantially alter Prime or Unique Farmland or community heritage.

4.10.2 No Action Alternative

Under the No Action Alternative, Pima County would not apply for a Section 10(a)(1)(B) permit and ESA compliance would continue on a project-by-project basis, as required. Land and infrastructure development, and building by the public and private sectors, would continue as projected. Under this alternative, impacts to ranching and agriculture would continue to be analyzed on a case-by-case basis, depending on the project and permitting requirements.

Under the No Action Alternative, Pima County would continue to implement elements of the SDCP and continue to use the CLS and other conservation measures to achieve conservation of natural and cultural resources.

Under the No Action Alternative, conservation of ranch land through the purchase of ranches from willing sellers and subsequent management of those lands both for grazing and open-space protection would continue to be undertaken as part of the SDCP and other existing conservation measures. The No Action Alternative could have the least potential for benefiting ranching and agriculture because ranch lands owned by Pima County would remain under threat of conversion to real estate development if the County BOS disposes of the land prior to initiating long-term conservation easements. Conversely, if the County maintains the open-space properties of ranch lands indefinitely, then the No Action Alternative would be beneficial to ranching. Under the No Action Alternative, there may be fewer opportunities for conflict between ranching and some of the condition goals that may accompany Section 10(a)(1)(B) permit coverage

under Alternatives B, C, and D. The condition goals under the action alternatives may require that ecosystem health measures such as vegetation coverage or aquatic resources take precedence over ranching-based measures such as utilization or animal units.

Overall, the No Action Alternative would not substantially alter Prime or Unique Farmland or community heritage. No significant adverse impacts to ranching or agriculture would likely result from the No Action Alternative.

4.10.3 Alternatives B, C, and D

Under Alternatives B, C, and D, a Section 10(a)(1)(B) permit would be issued for proposed Covered Activities (that vary by alternative). Most Covered Activities (ground disturbance and construction) under the action alternatives would occur within the existing built environment. However, lands required as mitigation for impacts to Covered Species from Covered Activities under Alternatives B, C, and D would likely be acquired from willing sellers, including ranchers and farmers.

Under Alternative B, Pima County would be responsible for the permanent protection of approximately 16,000 acres (see Table 4.2). This would be achieved with a subset of the County-owned fee lands that have already been acquired for conservation purposes (see Table 4.9). No additional lands, including ranch and farmlands, would need to be acquired for mitigation purposes under Alternative B.

Under Alternatives C and D, Pima County would be responsible for the permanent protection of approximately 252,000 acres (Alternative C) or approximately 116,000 acres (Alternative D). Additional lands, including ranch and farmlands, would need to be acquired, and land use potentially changed, under Alternative C, and possibly under Alternative D. Under Alternatives C and D, ranch and farmland acquisitions may result in minor reductions in irrigated agricultural lands or lands available for grazing when these lands are acquired as mitigation for impacts of Covered Activities.

Alternative B would not likely result in impacts to farming directly. Under Alternatives C and D there is a potential for farming and agricultural uses to decline if willing parties sell to Pima County water rights that are currently being used to support such agricultural uses and if Pima County were to retire those uses (retire water rights).

Implementation of conservation strategies required for Section 10(a)(1)(B) permit issuance and compliance would occur under Alternatives B, C, and D. These conservation strategies include the use of conservation easements, which would allow for the continuation of grazing. These strategies would also include a significant increase in rangeland monitoring to determine long-term trends in conditions and to inform stocking rates based on monitoring of climatic conditions. These conservation strategies would result in beneficial effects to ranching and agriculture.

Under all alternatives, Pima County would continue the long-standing commitment to support ranching as a preferable land use—as compared to development in exurban areas of the County—which would continue to provide benefits to ranching and agriculture. The Ranch Conservation Element of the SDCP is based on the strategy of conserving large areas of private ranch land. In addition and under all alternatives, Pima County would continue to partner on projects that benefit ranchers and enhance biological value, and promote agricultural tourism as a benefit to ranchers, farmers, and the local economy.

Overall, Alternatives B, C, and D would not substantially alter Prime or Unique Farmland or community heritage. Ranching and agriculture activities by the private sector are not Covered Activities under the draft MSCP, and it is unlikely that issuance of a permit or implementation of the MSCP would result in any alterations to the existing environment. No significant adverse impacts to ranching or agriculture would likely result from these alternatives.

4.11 Cultural and Historic Resources

4.11.1 Criteria for Determining Significance

The criteria for determining significance of impacts of alternatives on cultural and historic resources are outlined below. Impacts would be significant if implementation would:

- Result in a violation of the NHPA or equivalent State regulations; or
- Alter or impact characteristics for which a cultural resource was eligible for inclusion on the NRHP.

4.11.2 No Action Alternative

Under the No Action Alternative, Pima County would not apply for a Section 10(a)(1)(B) permit and ESA compliance would continue on a project-by-project basis, as required. Land and infrastructure development, and building by the public and private sectors, would continue as projected. Under this alternative, impacts to cultural and historic resources would continue to be analyzed on a case-by-case basis, depending on the project and permitting requirements.

Under the No Action Alternative, Pima County would continue to implement elements of the SDCP and continue to use the CLS and other conservation measures to achieve conservation of natural and cultural resources. In addition, Pima County would continue to review, evaluate, and require mitigation for impacts to cultural and historic resources from development related activities.

Under the No Action Alternative, Pima County would continue to place a high priority on cultural and historical resource protection, as exemplified by the significant attention these resources received in the development of the SDCP. Public interest and Pima County's focus on cultural resources has resulted in the acquisition of land parcels including the Dakota Wash, Honey Bee Village, Coyote Mountains Complex, Los Morteros, Pantano Townsite, San Agustin Mission Gardens, Tumamoc Hill, and the Valencia Site. Future bond-funded projects include acquisition of the Historic Fort Lowell Park. In addition to acquisitions, Pima County has developed and implements a robust cultural resources program that is now integrated into County operations. For example, Pima County requires pre-construction cultural resource surveys for Capital Improvement Program projects. These and other County policies are expected to continue under the No Action Alternative.

Under the No Action Alternative, Pima County's principal response to the effects of land use and development on cultural resources would continue to be reactive. Under existing policy and regulation, all County public works projects, as well as certain private land developments, are subject to cultural resources requirements as a part of the project review and approval process. In practical terms, once a project has gone to the design stage, the options to conserve cultural resources are either very limited or non-existent. Therefore, with few exceptions, most cultural resources that would be affected by proposed land use change and development subject to County approval would only be recorded prior to their destruction.

The No Action Alternative would be the least able of all the alternatives to provide long-term assurances for conservation lands uses on mitigation lands. Without legally binding assurances otherwise, current open-space parcels could be sold for development, thus, incidentally causing adverse impacts to cultural resources found on these parcels.

Under the No Action Alternative, existing policies for cultural resources would remain the same and would not likely result in violation of the NHPA or equivalent State regulations or alter or impact characteristics qualifying a cultural resource for eligibility under the NRHP. For those projects that have reached the design stage, cultural resources that would be affected by proposed land use change and development subject to County approval would only be recorded prior to their destruction.

4.11.3 Alternatives B, C, and D

Under Alternatives B, C, and D, a Section 10(a)(1)(B) permit would be issued for proposed Covered Activities (that vary by alternative). Covered Activities include ground disturbance and development, which would result in potential impacts to cultural and historic resources. Conditions of the Section 10(a)(1)(B) permit would require the mitigation and conservation for impacts to Covered Species, which would also benefit cultural and historic resources, for those activities covered under the permit that result in impacts.

Cultural and historic resources have received significant attention in the SDCP planning process (Pima County 2000d, 2002c). As part of an impact analysis for cultural and historic resources under that process, the following resources were inventoried in eastern Pima County:

- number of archaeological sites (i.e., number of all known archaeological sites from all time periods);
- number and acres of priority archaeological sites. Frequency and size of all known archaeological sites that the County has identified as having extraordinary importance to the history and culture of the citizens of Pima County;
- number and acres of priority archaeological site complexes. Frequency and size of areas containing dense clusters of archaeological sites that have been identified as having extraordinary importance to the history and culture of the citizens of Pima County;
- number of priority historic sites (i.e., counts of all known historic sites that the County has identified as having extraordinary importance to the history and culture of the citizens of Pima County); and
- acres of archaeological sensitivity zone (i.e., the number of acres predicted to have high and moderate sensitivity [combined] for all archaeological sites).

Alternatives B, C, or D would continue a commitment to the conservation of cultural and historic resources by their provision of a landscape-scale organizational framework for establishing a conservation easement program and purchasing culturally significant lands. Long-term monitoring and management of mitigation lands would be carried out in conjunction with the County's Cultural Resources Office to ensure that damage to cultural and historic resources would not occur as a result of natural resource monitoring and management activities required as part of the Section 10(a)(1)(B) permit.

Under Alternatives B, C, and D, mitigation requirements for Covered Activities would result in the conservation of intact landscape elements and forms, and, thereby, result in avoidance or minimization of impacts to known and potentially occurring, but as yet undiscovered, cultural resources within these landscapes. The element of conservation, included in the action alternatives, would provide assurances that cultural and historic resources would be retained in the future and result in beneficial effects to these resources. In addition, the acquisition of open space lands that could contain valuable cultural resources would have potential beneficial effects on cultural resource conservation. As with biological resources, the permanent protection of lands through use of conservation easements would benefit cultural resources, and no significant impact would occur as a result of Alternatives B, C, or D.

4.12 Recreation

4.12.1 Criterion for Determining Significance

The following criterion was used for determining significance of impacts of alternatives on recreation: impacts would be significant if implementation would reduce recreational opportunities for a substantial segment of the population.

4.12.2 No Action Alternative

Under the No Action Alternative, Pima County would not apply for a Section 10(a)(1)(B) permit and ESA compliance would continue on a project-by-project basis, as required. Land and infrastructure development, and building by the public and private sectors, would continue as projected. Under this alternative, impacts to recreation would continue to be analyzed on a case-by-case basis, depending on the project and permitting requirements.

Under the No Action Alternative, Pima County would continue to implement elements of the SDCP and continue to use the CLS and other conservation measures to achieve conservation of natural and cultural resources. Under all alternatives, Pima County would continue to support recreational opportunities through the construction and maintenance of a system of parks, trails, and open space network capable of meeting the outdoor recreation needs of current and future residents of Pima County. The No Action Alternative may be the most supportive of the alternatives of outdoor recreation because the terms of the Section 10(a)(1)(B) permit issuance and management of key resources may preclude or restrict the use of some areas for recreational purposes. For example, recreation is limited in Cienega Creek Preserve due to its importance for wildlife and water resources.

It may be possible, under the No Action Alternative, for Pima County to dispose of mitigation lands, thereby potentially eliminating recreational opportunities. In addition, long-term land protection and monitoring would not likely occur under the No Action Alternative.

Overall, the No Action Alternative would not result in a reduction of recreational opportunities for a substantial segment of the population. No significant adverse effects are likely to occur under this alternative.

4.12.3 Alternatives B, C, and D

Under Alternatives B, C, and D, a Section 10(a)(1)(B) permit would be issued for proposed Covered Activities (that vary by alternative). Most Covered Activities (ground disturbance and construction) under the action alternatives would occur within the existing built environment.

As a result of mitigation requirements for impacts of Covered Activities to Covered Species under the Section 10(a)(1)(B) permit, Alternatives B, C, and D would all result in a regional framework for permanently conserving land for current and future generations of recreationists in Pima County. The amount of land needed to mitigate for Covered Activities varies by alternative; under Alternatives C and D the total amount of open space required for mitigation and conservation would be greater than under Alternatives A and B.

Under Alternatives B, C, and D, Pima County would continue to provide recreational opportunities for a growing population under the direction of the Natural Resources, Parks and Recreation Department. The County's parks system and the trails network would continue to be maintained and expanded; cooperation with Federal, State, and local land management agencies would continue under all alternatives, particularly with the State Land Department because of the inter-connectedness of State and County-owned lands in open-space acquisitions (see Figure 3.13). In addition, under all alternatives, outdoor recreational opportunities would be enhanced by the purchase of lands for open-space protection. Outdoor recreation activities, including hiking, biking, hunting, horseback riding, and nature appreciation would continue to be allowed in these lands. The Mountain Park Element of the SDCP would benefit from the addition of conservation lands that would expand the boundaries of mountain parks. For example, Pima County's effective expansion of Tucson Mountain Park through the development of the Robles Pass Trail Park and development of the Sweetwater Preserve resulted in recreational opportunities that would not likely have been possible without the need for open space protection. Natural Open Space Set-asides, those areas of on-site minimization created in the land subdivision process, would also provide non-destructive recreational opportunities to respective home-owner-association members and their guests.

All alternatives seek to build on the formalized management framework designed to meet Pima County's growing outdoor recreation needs while protecting biological resources. In accordance with recommendations from the SDCP, Recreation Technical Team, and STAT, both the values and impacts of natural resource-based recreation would be given full consideration in developing the management plans and in managing conservation lands. By doing this, potential conflicts between recreational activities and wildlife habitat would be addressed and minimized, if not avoided.

Inter-governmental cooperation to accomplish mutual outdoor recreational goals would be strengthened by all alternatives. Such cooperation would provide a formal means of identifying concerns, collaborating on solutions, sharing information, and partnering in stewardship responsibilities for all signatories to the plan. This cooperative framework would also provide greater opportunities for non-profit organizations to better contribute to the improvement and monitoring of recreational areas.

Alternatives B, C, or D would support and enhance Pima County's Mountain Park Element because most recreation takes place in these areas and many mitigation lands are being amassed there. Impacts associated with recreational use, such as surface disturbance, erosion, and degradation of wildlife habitat would be mitigated through the purchase and permanent conservation of open space.

Pima County's *Trails System Master Plan* would benefit from implementation of the action alternatives due to increased protection and restoration of riparian areas, with which the major portion of the trails system is associated. The purchase of additional lands and recording of conservation easements would fully consider trail access, use agreements, and long-term connectivity of the regional trails system. Pima County's SDCP, the proposed alternatives, and the Comprehensive Land Use Plan policies regarding trails would be mutually supportive and would contribute to an interconnected system linking urbanized areas with the surrounding public lands system.

As an indirect consequence of management and monitoring of biological resources proposed under the action alternatives, the passive recreational experience would potentially be enhanced through the maintenance of intact landscapes and such monitoring elements as early detection of invasive species that may impact visitor's experience. For example, the rapid spread of buffelgrass in many areas of the County will likely cause a diminishment of recreational opportunities and visitor enjoyment because of the impact that this species can have on the structure, intactness, and biodiversity of native plant and animal communities.

Overall, the Alternatives B, C, and D would not result in a reduction of recreational opportunities for a substantial segment of the population. However, Pima County may temporarily restrict recreational activities to protect nests of covered bird species, and would avoid and minimize impacts to species during any recreational trail construction activities. No significant adverse effects are likely to occur under any of these alternatives.

4.13 Mineral Resources

4.13.1 Criterion for Determining Significance

The following criterion was used for determining significance of impacts of alternatives on mineral resources: impacts would be significant if implementation would substantially restrict current or future mineral resource extraction operations.

4.13.2 No Action Alternative

Under the No Action Alternative, Pima County would not apply for a Section 10(a)(1)(B) permit and ESA compliance would continue on a project-by-project basis, as required. Land and infrastructure development, and building by the public and private sectors,

would continue as projected. Under this alternative, impacts to mineral resources would continue to be analyzed on a case-by-case basis, depending on the project and permitting requirements.

Under the No Action Alternative, regulatory control related to mining would be the same as currently exists. Mining lands, including mines and aggregate extraction areas, would continue to be designated on Pima County's Comprehensive Land Use Plan maps as "Resource Extractive" lands and be protected for their extractive capabilities and from encroachment by incompatible uses. Pima County RFCD would continue to stipulate conditions in the floodplain use permits issued for sand, gravel, and other excavations in floodplains in accordance with the Pima County Code. Those permits would continue to have a requirement for a reclamation plan for excavated areas.

Under the No Action Alternative, Pima County would continue to restrict discretionary actions relating to mining from County-owned designated parks and preserves and to comment on State and Federal mining actions that would affect the health, safety, and welfare of Pima County citizens. Such input is exemplified by Pima County's staff time associated with the proposed Rosemont Mine. Permits issued by the Pima County RFCD for aggregate mining, especially those within watercourses identified as important riparian areas, would continue to be carefully considered.

Minor adverse impacts to mineral resources could result from the No Action Alternative when Pima County acquires mineral rights with new land purchases, or through exercise of existing regulatory or advisory powers. Overall, the No Action Alternative would not substantially restrict current or future mineral resource extraction operations; therefore, no significant impacts to mineral resources would be expected to occur under the No Action Alternative.

It is possible that Pima County would scrutinize mineral permit requests in and near designated parks and preserves at a higher level than what would be done when impacts are distant from these protected areas.

4.13.3 Alternatives B, C, and D

Under Alternatives B, C, and D, a Section 10(a)(1)(B) permit would be issued for proposed Covered Activities (that vary by alternative). Most Covered Activities (ground disturbance and construction) under the action alternatives would occur within the existing built environment. Effects on mineral resources under Alternatives B, C, or D would be similar to those outlined under the No Action Alternative. Pima County may scrutinize mineral permit requests in and near designated parks and preserves at a higher level than is done when impacts would be distant from these protected areas.

Under Alternatives B, C, and D, mineral resource exploration and extraction would continue to be subject to current and future regulations. Mineral districts and known

resources occur throughout Pima County, and the potential for further discovery and development exists under all alternatives. Impacts associated with proposed mining activities would continue to be analyzed as required under NEPA, State, or local law with appropriate levels of mitigation incorporated into permitted activities. The State Land Commissioner and the State Mine Inspector would continue to be the authorizing entities for mining leases, access, and inspections on State lands. Federal land mining claims would continue to be recorded with the BLM and permitted subject to NEPA analysis and approval.

Under Alternative B, Pima County would be able to achieve acquisition of lands required for mitigation of Covered Activities impacts with a subset of the County-owned fee lands that have already been acquired for conservation purposes (see Table 4.9). No additional lands, including land with mining potential, would need to be acquired for mitigation purposes.

Under Alternatives C and D, Pima County would be responsible for the permanent protection of approximately 252,000 acres (under Alternative C) or approximately 116,000 acres (under Alternative D). Additional lands would need to be acquired and land use potentially changed under Alternative C and possibly under Alternative D. Under Alternatives C and D, land acquisitions may result in minor reductions in lands available for mining, primarily aggregate mining resources. Aggregate mining resources are typically widely distributed and land acquisitions would not likely result in a significant decrease in the availability of these resource areas. However, Alternatives C and D may result in a greater adverse impact to aggregate mining than the No Action Alternative or Alternative B.

Pima County would seek to acquire mineral rights if available as part of land acquisitions. Once mineral rights are acquired, Pima County would prohibit the extraction of minerals through conservation easements.

Mineral extraction is not a Covered Activity under the MSCP. Therefore, issuance of an incidental take permit and implementation of the MSCP under Alternatives B, C, and D would not result in any significant effects to the existing environment. Overall, Alternatives B, C, and D would not substantially restrict current or future mineral resource extraction operations. No significant adverse impacts to mineral resources would result from these alternatives.

4.14 Socioeconomics

4.14.1 Criterion for Determining Significance

The following criterion was used to determine significance of impacts of alternatives on socioeconomics: impacts would be significant if implementation would result in

measurable change in the population, or community and social relationships, or result in measurable economic impacts.

4.14.2 No Action Alternative

Under the No Action Alternative, Pima County would not apply for a Section 10(a)(1)(B) permit and ESA compliance would continue on a project-by-project basis, as required. Land and infrastructure development, and building by the public and private sectors, would continue as projected. Under this alternative, impacts to socioeconomics would continue to be analyzed on a case-by-case basis, depending on the project and permitting requirements.

Under the No Action Alternative, Pima County's socioeconomic climate would likely continue much as it does currently. Demographic trends and population increases would continue. Pima County would continue to provide community services to a population increasingly distributed in outlying areas. Costs associated with providing those services would likely continue to outpace the revenue generated by property taxes on unregulated subdivision areas, which is characteristic for low-density rural development outside urban infrastructure. Pima County would continue to acquire and manage lands for open space purposes, which would increase the value of adjoining lands for development. The No Action Alternative, with no legally binding long-term commitment to landscape conservation, would therefore be least able of all the alternatives to support the local economic sector of environmentally based tourism. In addition, under the No Action Alternative, ESA compliance would continue on a case-by-case basis, which would increase costs related to development as compared to the action alternatives.

The No Action Alternative would not result in a measurable change in the Pima County population, or result in a significant change in community or social relationships. The No Action Alternative may result in measurable economic impacts to land developers related to the costs of ESA compliance on a case-by-case basis.

4.14.3 Alternatives B, C, and D

Under Alternatives B, C, and D, a Section 10(a)(1)(B) permit would be issued for proposed Covered Activities (that vary by alternative). The majority of Covered Activities (ground disturbance and construction) under the action alternatives would occur within the existing built environment, where potential impacts to urban populations and community character may occur. Socioeconomic impacts were evaluated in 2003 with regard to demographics, economics, community services, and future growth projections (ESI Corporation and SWCA Environmental Consultants 2003). No updates of these impacts have been performed for the Final EIS.

Under Alternative B, Pima County would be able to achieve acquisition of lands required for mitigation of Covered Activity impacts on Covered Species with a subset of the

County-owned fee lands that have already been acquired for conservation purposes (see Table 4.9). No additional lands would need to be acquired for mitigation purposes. Under Alternatives C and D, Pima County would be responsible for the permanent protection of approximately 252,000 acres (under Alternative C) or approximately 116,000 acres (under Alternative D). Additional lands would need to be acquired and land use potentially changed under Alternative C and possibly under Alternative D. Alternative C, and to a lesser extent Alternative D, could affect socioeconomics if these mitigation lands were acquired primarily from the private sector. Private sector acquisitions would require funds from bonding or the County tax base, which may increase tax requirements for Pima County's population, resulting in an adverse socioeconomic impact. However, mitigation requirements under Alternatives C and D may also be achieved through the improvement of the condition of County-owned and County-managed State Trust Lands, as well as acquiring State Trust Lands that would not likely be developed. These mitigation measures would minimize or eliminate the need for additional bond or tax funds, minimizing or eliminating potential adverse socioeconomic impacts.

Under Alternative C, and to a lesser extent Alternative D, Pima County bonding capacity may be impacted. Any County general obligation bonds issued for any project would diminish bond capacity. The tradeoffs among potential uses of bonding capacity are weighed by Pima County's Bond Acquisition Committee, and decided by the Pima County BOS. In the event that additional mitigation lands must be acquired using County bonding authority, the Bond Acquisition Committee and Board would consider the merits of open space acquisition relative to other potential bond projects and relative to the cumulative effects of each on County bonding capacity. The Bond Acquisition Committee is responsible to the County electorate and voters must approve future bonds. It would be unlikely that the Bond Acquisition Committee or electorate would approve a bond that would significantly impair delivery of other socioeconomic goods.

Under Alternative D, under the Opt-in Provision, a private property owner may be assessed fees for receiving coverage under the Section 10(a)(1)(B) permit. If assessed, the application fee would be assessed based on the County's investment of resources necessary to process and issue the 10(a)(1)(B) permit coverage for development. An additional monitoring fee would be required where Opt-in Provisions result in natural open space that is utilized as permit mitigation land. The County's collection of this monitoring fee is necessary to defray costs associated with permit obligations to perpetually monitor the status of mitigation lands. Current estimates indicate that the cost to obtain permit coverage for an individual development would be approximately \$5,000 (in 2013 dollars), but this figure has not been finalized. Additional details related to the fee structure can be found in Chapter 4, Section 4.5.2 of the MSCP (see Pima County MSCP). Fees are expected to be below the costs of case-by-case consultation with the USFWS regarding potential impacts to threatened and endangered species that

may occur in or near the proposed development area. These fees would not likely result in a significant economic impact on private development under Alternative D.

Under Alternatives B, C, and D, the potential beneficial effects of a Section 10(a)(1)(B) permit on employment generation and new housing demand were highlighted in the report by ESI and SWCA (2003). That report found that employment generation and new housing demand was associated with two key factors: a greater certainty and predictability in the land development process and the greater likelihood of attracting an educated workforce for whom open space and natural amenities are of value. Making the development process more straightforward, developable land more clearly defined, and costs more tightly contained, a Section 10(a)(1)(B) permit for the Pima County MSCP would facilitate regulated development. Providing community services to regulated development is generally more cost-effective than for unregulated development due to less-dispersed infrastructure, facilities, and population.

Alternatives B, C, or D would more strongly promote an environmentally based economy by protecting and enhancing tourism, particularly ecotourism. This economic aspect is compatible with current community efforts to develop a biotechnology cluster in southern Arizona. In general, all action alternatives are expected to have a beneficial socioeconomic impact by permanently protecting visual quality and unique sense of place, enhancing quality of life, supporting and promoting ecotourism, and providing for long-term population growth and development in a predictable, regulated context. Under Alternatives B, C, and D, the beneficial effects of the Conservation in Perpetuity Element of the Section 10(a)(1)(B) permit would support local and national efforts to establish the proposed Santa Cruz Valley National Heritage Area, which includes much of eastern Pima County. This National Heritage Area designation would provide a framework for a regional economic development strategy that is expected to stimulate tourism-related increases in local jobs, business incomes, and tax revenues. Alternatives B, C, and D would contribute to the goals of the Santa Cruz Valley National Heritage Area, which recognize that the people who live in a heritage area are uniquely qualified to preserve its resources.

Overall, based on potential adverse and beneficial effects on socioeconomics, Alternatives B, C, and D would not likely result in a measurable change in the Pima County population, result in a significant change in community or social relationships, or result in a measureable economic impact.

4.15 Utility Rights-of-way

4.15.1 Criterion for Determining Significance

The following criterion was used to determine significance of impacts of alternatives on utility rights-of-way: impacts would be significant if implementation would conflict with the operations, maintenance, design, or construction of existing utility rights-of-way.

4.15.2 No Action Alternative

Under the No Action Alternative, Pima County would not apply for a Section 10(a)(1)(B) permit and ESA compliance would continue on a project-by-project basis, as required. Land and infrastructure development, and building by the public and private sectors, would continue as projected. Under this alternative, impacts to utility rights-of-way would continue to be analyzed on a case-by-case basis, depending on the project and permitting requirements.

Under the No Action Alternative, there would be a continued reliance on the CLS to concentrate growth away from biologically important areas and near to existing infrastructure, thereby reducing conflicts with natural resource protection plans. A more compact urban form, with both the acquisition of open-space parcels and application of CLS siting guidelines, would reduce the need for utilities to serve a patchwork of isolated customers and reduce conflict with existing utility rights-of-way. However, the No Action Alternative would be the least able of all the alternatives to provide long-term assurances for conservation lands uses on mitigation lands. Without legally binding assurances otherwise, current open-space parcels could be sold for development, potentially causing conflicts between urban expansion, natural resource protection, and the utility right-of-way infrastructure.

Under the No Action Alternative, Pima County would continue to work with utilities planning new structures to avoid, minimize and mitigate impacts to cultural and biological resources, including those located on County open-space lands. The No Action Alternative would not likely result in significant conflicts with the operation, maintenance, design, or construction of utility rights-of-way. Overall, the No Action Alternative is not expected to have significant adverse impacts on utility rights-of-way or future planning for utilities.

4.15.3 Alternatives B, C, and D

Under Alternatives B, C, and D, a Section 10(a)(1)(B) permit would be issued for proposed Covered Activities (that vary by alternative). Most Covered Activities (ground disturbance and construction) under the action alternatives would occur within the existing built (urban) environment. Under Alternatives B, C, and D, protective measures for important riparian areas within the urbanizing area may pose some conflicts with

linear underground utility siting. However, the trend in the last decade or more has been to locate utilities (e.g., sewer lines and overhead electric lines) well outside of washes and riparian habitat. Pima County would give careful consideration in siting discretionary utility alignments and corridors under all alternatives in order to meet the conservation requirements of the CLS.

Alternatives B, C, and D would not directly trigger impediments to the major transmission line proposals under consideration in eastern Pima County. Their siting is under the authority of the Arizona Corporation Commission, not Pima County. The NEPA documents required for Federal discretionary permits associated with the installation of the support structures and the power lines would require such transmission line project proponents to demonstrate compatibility with the local planning efforts, including Pima County's Comprehensive Land Use Plan and CLS; however, decisions to overrule local land use plans or policies are not precluded.

Siting of renewable energy projects, such as solar power plants, on private lands within the Permit Area would be subject to review by Pima County for conformance with the regulations and development standards of the underlying zone. Currently, renewable energy projects are considered permitted uses (BOS non-discretionary) in commercial and industrial zones, but would require a Conditional Use Permit (BOS discretionary) in rural zones. Solar energy projects on Federal lands (e.g., BLM lands) are not subject to review by Pima County.

Alternatives B, C, and D could result in beneficial impacts to Pima County utility right-of-way projects. These types of projects would need to meet standards set by the action alternatives' conservation commitments and would be Covered Activities under a Section 10(a)(1)(B) permit, thereby streamlining ESA compliance and regulatory approval of these projects. Utility activities covered by County-issued permits or rezonings under Alternatives C or D would be able to use the County's Section 10(a)(1)(B) permit to achieve ESA compliance. Utility activities outside the discretion of Pima County would remain subject to the ESA as they are today.

Alternatives B, C, and D would not likely result in significant conflicts with the operation, maintenance, design, or construction of utility rights-of-way. Overall, Alternatives B, C, and D are not expected to have significant adverse impacts on utility rights-of-way, future planning for utilities, or renewable energy projects.

4.16 Wildland Fire Management

4.16.1 Criteria for Determining Significance

The criteria for determining significance of impacts of alternatives on wildland fire management are outlined below. Impacts would be significant if implementation would:

- impede or cause delays to wildland fire management activities, or
- result in significant increase of wildland fire hazards.

4.16.2 No Action Alternative

Under the No Action Alternative, Pima County would not apply for a Section 10(a)(1)(B) permit and ESA compliance would continue on a project-by-project basis, as required. Land and infrastructure development, and building by the public and private sectors, would continue as projected. Under this alternative, impacts to wildland fire management would continue to be analyzed on a case-by-case basis, depending on the project and permitting requirements.

The No Action Alternative has the least potential to beneficially impact fire management, because open-space parcels would not be bound by Section 10(a)(1)(B) permit requirements for permanent conservation protection. This is expected to continue to increase fragmentation of natural areas and, thereby, increase the risk of wildland fire in urbanizing areas. The No Action Alternative would not require the implementation of a monitoring program to detect and minimize fire management threats such as the spread of invasive species.

Overall, the No Action Alternative would not likely result in a significant increase of potential wildland fire hazards. The No Action Alternative would not likely impede or cause delays to wildland fire management activities. No significant adverse impacts to wildland fire management are anticipated to result from implementation of the No Action Alternative.

4.16.3 Alternatives B, C, and D

Under Alternatives B, C, and D, a Section 10(a)(1)(B) permit would be issued for proposed Covered Activities (that vary by alternative). Most Covered Activities (ground disturbance and construction) under the action alternatives would occur within the existing built environment. Effects on wildland fire management under Alternatives B, C, or D would be minimized because most impacts from Covered Activities would occur in urbanized areas, at a distance from open space areas where wildland fires may be a hazard.

Under Alternatives B, C, and D, the beneficial effects of the Conservation in Perpetuity Element of a Section 10(a)(1)(B) permit coupled with the invasive species monitoring and management proposed would support effective wildland fire management. Promoting the use of prescribed fire is currently being evaluated as a management strategy by Pima County.

Beneficial effects of conserving land and minimizing fire-prone invasive plant species would accrue under all alternatives. Pima County's acquisition and protection of open-space parcels would likely lead to fewer roads and fewer developments within and bordering natural areas. Fewer roads and land disturbance activities would reduce the potential spread of fire-prone invasive grass species—most notably buffelgrass—an increasing problem for wildland fire management in Pima County. Alternatives B, C, and D would also provide a management structure (by Pima County Natural Resources, Parks and Recreation Department) for County-controlled lands, thereby creating efficiencies in fire management practices and facilitating communication with appropriate firefighting entities.

Overall, Alternatives B, C, and D would not likely result in a significant increase of potential wildland fire hazards and would not likely impede or cause delays to wildland fire management activities. No significant adverse impacts to wildland fire management are anticipated to result from implementation of Alternatives B, C, and D.

4.17 Environmental Justice

4.17.1 Criteria for Determining Significance

The criteria for determining significance of impacts of alternatives on environmental justice are outlined below. Impacts would be significant if implementation would result in:

- actions that could lead to a potential reduced income/employment to minority or low-income communities;
- actions that could lead to an impediment to economic development in low-income or minority communities; or
- actions that could lead to disproportionately high and adverse impacts to human health and safety impacts on minority and low-income populations.

4.17.2 No Action Alternative

Under the No Action Alternative, Pima County would not apply for a Section 10(a)(1)(B) permit and ESA compliance would continue on a project-by-project basis, as required. Land and infrastructure development, and building by the public and private sectors, would continue as projected. Under this alternative, impacts to environmental justice would continue to be analyzed on a case-by-case basis, depending on the project and permitting requirements.

The No Action Alternative would be the least able of all the alternatives to provide long-term assurances for conservation lands uses on mitigation lands. Without legally binding assurances otherwise, current open-space parcels could be sold for development. The

loss of conservation lands to development would likely result in impacts to scenic vistas, open spaces, and wildlife habitats that have a particular value and meaning to several minority populations. However, it is not likely that significant acres of conservation lands would be sold for development overall. The No Action Alternative would not likely result in disproportionately high and adverse impacts to human health and environmental effects, including social and economic, on minority populations and low-income populations.

4.17.3 Alternatives B, C, or D

Under Alternatives B, C, and D, a Section 10(a)(1)(B) permit would be issued for proposed Covered Activities (that vary by alternative). The majority of Covered Activities (ground disturbance and construction) would occur within the existing built environment. As a result of mitigation requirements for Covered Activities under the Section 10(a)(1)(B) permit, Alternatives B, C, and D would all result in a regional framework for permanently conserving land in Pima County.

Under Alternatives B, C, and D, the issuance of a Section 10(a)(1)(B) permit would not likely change the patterns of development within the built environment or within the CLS. For the private sector, the permit would be voluntary and applicants could elect coverage when requesting building or site construction permits from Pima County. The Section 10(a)(1)(B) permit would not require construction to occur in specific areas and would not have a significant influence on decisions related to siting of development. Based on current and projected development trends, the issuance of a Section 10(a)(1)(B) permit would not result in increased costs of development and housing, overcrowding, or health issues to minority and low-income populations.

Alternatives B, C, or D would be equally better able to promote environmental justice than the No Action Alternative by supporting the Comprehensive Land Use Plan, promoting the conservation rather than development of areas outside of the transportation network, and providing a landscape-scale organizational framework for conserving culturally significant lands.

Alternatives B, C, and D would not result in disproportionately high and adverse impacts to human health and environmental effects, including social and economic, on minority and low-income populations.

4.18 Cumulative Effects

4.18.1 Introduction

A discussion of the potential cumulative impacts of a proposed action and alternatives is required by NEPA. The Council on Environmental Quality defines cumulative impacts as the:

impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time. (40 CFR 1508.7)

Cumulative impacts are considered in the context of time and geographic setting. In the case of this analysis, the relevant timeframe is the 30-year Section 10(a)(1)(B) permit period. The geographic context is eastern Pima County.

By virtue of developing and analyzing a set of landscape-scale ecosystem conservation plan alternatives as summarized in this document, a cumulative effects analysis has largely been completed. The alternatives analysis has taken into account future development and public works within unincorporated areas of Pima County that would be subject to the ESA.

Development will continue to occur in Pima County, which, left by itself, is expected to have adverse consequences on the natural resources within the County. More development will result in loss of key conservation targets (CLS, Special Elements, and Covered Species) and other consequences such as the likely increase in non-native, invasive species, altered ecosystem functioning, and pollution. Pima County is restricted in its authority to respond to these threats and, therefore, none of the alternatives would have a significant effect on how much development will occur. However, Pima County has shown a commitment to directing growth towards those areas that are less environmentally sensitive. The action alternatives further the conservation of the CLS, Special Elements, and Covered Species through their proposed mitigation, management, and monitoring programs.

The alternatives and other regional planning efforts are mutually supportive and beneficial. For example, the projected growth areas of Pima County and the cities and towns of Marana, Tucson, Oro Valley, and Sahuarita do not conflict with the establishment of Ironwood Forest National Monument and Las Cienegas National Conservation Area, the expansion of Pima County Mountain Parks system, or the large-scale riparian restoration plans being developed by the U.S. Army Corps of Engineers in partnership with local jurisdictions.

The CLS supports, rather than conflicts with, the existing public lands system as managed by Pima County and the Federal government. Cumulative effects would be minimized by cooperation between the County and other parties who would be assisting in the management and monitoring of County-controlled mitigation lands. Also minimizing cumulative effects would be the goal of conservation planning efforts being undertaken by other jurisdictions within Pima County. The Town of Marana and the City of Tucson are in the process of developing habitat conservation plans in support of

Section 10(a)(1)(B) permit applications. These plans are being prepared in general conformance to Pima County's SDCP and the CLS.

Cumulative impacts assessment is relevant to all resources analyzed in this Chapter. However, assessing cumulative impacts for many resource areas on a regional basis for projects or actions that are not described or analyzed in detail would be speculative.

4.18.2 Reasonably Foreseeable Future Actions

Cumulative impacts of the proposed action and alternatives are assessed in the context of how they would combine with other existing or developing, regionally significant projects or actions to produce an additive effect.

Relevant projects or actions are discussed below.

- Sale or lease of State Trust Lands. Cumulative actions that could affect regional goals of the CLS would result from the disposal of State Trust Lands, or long-term leases that would result in extensive removal of natural land cover. Such leases and sales by public auction are within the legal purview and mandate of the State Land Department and are undertaken on a routine basis. Subsequent large-scale or fragmented development of these lands could occur after sale or lease. Specific examples might include Freeport McMoRan's application to acquire 8,510 acres of land. Until other specific property sales are proposed and available for public review, a more specific evaluation of the associated impacts is not possible. However, if the disposal lands included ranch lands currently managed for conservation values, Pima County's conservation efforts could be adversely affected and the cumulative effect on biological resource values could be significant. The State Trust Lands, which comprise approximately 22 percent of the CLS, are of particular concern, as their development could greatly diminish the conservation value of the CLS. Alternatives C and D provide incentives for Pima County to acquire and protect in perpetuity State Trust Lands for mitigation purposes.
- Federal land management plans or decisions. Actions by Federal land management agencies in combination with Pima County's conservation actions under a Section 10(a)(1)(B) permit could provide cumulative effects. Examples:
 - BLM manages a land exchange program, whereby BLM acquires state and private lands having high natural resources and other public values. The Las Cienegas Riparian National Conservation Area was acquired through such an exchange. In return, BLM trades public lands with lesser resource value. Pima County has acquired a number of former BLM lands through the Recreation and Public Purposes Act. Under Alternatives C and D, Pima County would have incentives to acquire and protect lands identified for

disposal by BLM. These types of decisions could have a cumulative beneficial effect in combination with the proposed action or alternatives.

- BLM also issues leases, rights-of-way, and use permits for a wide variety of uses, which include parks, mineral extraction (locatable, leasable, and salable minerals), power transmission lines, and roads. Decisions allowing surface disturbance on CLS lands could cumulatively diminish the conservation value of the CLS. None of the action alternatives are thought to result in additional cumulative impacts of this type.
- Coronado National Forest has received a proposed Plan of Operations by the Rosemont Mining Company for mining and processing of copper, molybdenum, and silver ore on 3,330 acres of land in the Santa Rita Mountains in southeastern Pima County. Cumulative effects of this proposal will be addressed in the development of Coronado National Forest's EIS. Adverse cumulative effects related to Pima County's conservation efforts could potentially include loss and fragmentation of habitat, interruption of wildlife movement patterns, alteration of water quality or quantity, and other effects on species proposed for Section 10(a)(1)(B) permit coverage by Pima County.
- Implementation of large-scale ecosystem restoration plans. Beneficial cumulative effects are expected to result from implementing proposed projects on which Pima County has partnered with the U.S. Army Corps of Engineers to develop, such as the Ecosystem Restoration Plans for Paseo de las Iglesias, El Rio Antiguo, and Tres Rios del Norte (in preparation). These plans for restoration along the Santa Cruz and Rillito Rivers have been developed in concert with development of the SDCP and MSCP and would provide cumulative benefits to biological resources, particularly for riparian species.
- The *Regional Transportation Authority Plan* includes \$45 million for transportation-related critical wildlife linkages as part of the environmental and economic vitality element of the plan. This element will provide funding for the design and construction of wildlife crossing improvements within future planned roadways and highways, as well as for retrofitting existing roadways and highways with wildlife crossing improvements. One example is the recently approved wildlife overpass as part of the proposed State Route 77/Oracle Road roadway improvements. This general location was identified during the development of the CLS as a critical landscape connection for wildlife movement. The cumulative beneficial effects of improving wildlife movement throughout the region would further the goals of the SDCP and other local conservation efforts.
- There are two transportation planning efforts under way that may potentially define a transportation corridor through Avra Valley. The Regionally Significant

Corridor Study will be routed through the Pima Association of Governments committee process for ultimate action by the PAG Regional Council. The Interstate 11 and Intermountain West Corridor Study is being undertaken by ADOT. This study is currently focused on transportation corridors between the Phoenix metropolitan area and Las Vegas, Nevada. Subsequent phases of this study will explore the feasibility of extensions into southern Arizona through Pima County. The ADOT Interstate 11 study will be presented for consideration by the State Transportation Board for adoption as a long-term plan for addressing transportation needs in the State of Arizona. The new proposed Interstate 11 route will avoid populated areas while steering clear of Ironwood National Forest, Saguaro National Park, and other environmentally sensitive lands. The proposed route would require nearly 5,000 acres of CLS mitigation. Funding sources have yet to be identified, but would require Federal, State, and local resources, with the primary funding coming from Federal and State sources.

- Ranch and farming activities will continue throughout Pima County. These activities include infrastructure improvement activities, such as construction of new stock tanks, cattle guards, and fencing. Pima County will also continue to manage County-owned and County-leased ranch lands under ranch management plans and continue to set expectations or goals about how grazing, wildlife improvements, and public access will be managed. Ranch and farmland activities are not likely to change significantly during the life of the Section 10(a)(1)(B) permit period (30 years). Cumulative impacts of grazing (ranch) and farming-related activities would continue to result in both beneficial (stock tanks, wildlife fencing) and adverse (impacts of grazing and infrastructure development) impacts.

4.19 Adverse and Irreversible Environmental Changes

Existing growth and development would continue. Only the portion of development having a Federal nexus would be evaluated for ESA impacts under the No Action Alternative. Mitigation on a project-by-project basis would occur, with a gradual cumulative and irreversible loss of open space and conservation opportunities, under Section 7. Similar irreversible losses would play out under Alternative B, C, or D, but to a much lesser degree.

Issuance of a Section 10(a)(1)(B) permit by the USFWS would result in some adverse and irreversible environmental changes. The Section 10(a)(1)(B) permit would allow the incidental take of listed species under the action alternatives. Other non-listed species proposed for coverage would be covered under a Section 10(a)(1)(B) permit as if they were listed.

Under the proposed Section 10(a)(1)(B) permit, Pima County and other proponents of land development would be required to manage, monitor and protect significant areas of undeveloped land as mitigation for adverse impacts to Covered Species and critical habitat. Pima County has acquired, and continues to acquire, land for mitigation purposes, primarily within the CLS, and has demonstrated its ability to provide initial and long-term funding for continued acquisition of mitigation lands.

Because Pima County provides overall mitigation by funding existing and future conservation measures under the action alternatives, habitat losses for Covered Activities would not require further mitigation on a project-by-project basis beyond standard obligations for adherence to the Pima County Code.

Once converted to a development use, existing habitat would no longer function as natural habitat for Covered Species. In some cases, direct loss of listed species could occur. Under the proposed alternatives, land development during the term of the permit may irrevocably convert certain amounts of Covered Species habitat in the County to a development use and that habitat could be lost in perpetuity.

Although the amount of take and habitat loss associated with Covered Activities would be largely irreversible, these losses would occur under the No Action Alternative as well, and there is no incremental increase in the amount of take or habitat loss anticipated because of the implementation of any of the action alternatives.

Under a Section 10(a)(1)(B) permit, Pima County would commit to conserve, manage, and monitor a portion of the unprotected open space in eastern Pima County so that these incremental changes are not likely to threaten the continued existence of any of the species proposed for coverage.

5.0 Relationship between Local Short-term Uses of the Environment and Maintenance and Enhancement of Long-term Productivity

Issuance of a Section 10(a)(1)(B) permit would result in some adverse impacts to federally listed species and their habitats. Measures to manage, monitor and mitigate these adverse impacts would be required as part of the Section 10(a)(1)(B) permit. Short-term uses of the environment typically result from construction activities. Long-term effects relate to the maintenance and enhancement of long-term productivity, in particular, the consistency of the proposed action with the long-term regional and local planning objectives.

5.1 No Action Alternative

Under the No Action Alternative, Pima County would not apply for a Section 10(a)(1)(B) permit and ESA compliance would continue on a project-by-project basis, as required. Under this alternative, land and infrastructure development, and building by the public and private sectors, would continue to occur within eastern Pima County. The short-term effects and uses of the environment would continue. Maintenance and enhancement of the long-term productivity of the environment would not be changed from current conditions under the No Action Alternative. Maintenance, enhancement, and conservation measures would occur on a case-by-case basis, if needed; enhancement of long-term productivity may be minimal under this alternative.

5.2 Alternatives B, C, and D

Under Alternatives B, C, and D, a Section 10(a)(1)(B) permit would be issued for proposed Covered Activities (that vary by alternative). The majority of Covered Activities (ground disturbance and construction resulting in short-term uses of the environment) would occur within the existing built environment. Alternatives B, C, and D were developed to attempt to balance the long-term development of private lands within Pima County's natural environment with initial and sustained funding for actions to conserve a wide variety of species and their habitats on unincorporated County lands.

Under Alternatives B, C, and D, Covered Activities under the Section 10(a)(1)(B) permit would occur on non-Federal lands or property disposed of by Federal agencies. Although the incidental take provisions of the Section 10(a)(1)(B) permit would apply only to non-Federal actions (i.e., land disturbance on private, County-owned, or State

lands), to provide a comprehensive analysis, the action alternatives anticipate some level of impacts on Federal lands as a result of increased public use.

Under Alternatives B, C, and D, all Covered Species under the Section 10(a)(1)(B) permit would be treated as though they were listed and would be subject to the standards set forth in Section 10(a)(1)(B) of the ESA and 50 CFR 17.32(b) and 17.22(b). By addressing the habitat needs of a wide spectrum of Covered Species, maintenance, enhancement, and conservation benefits to many other species that use the same areas and habitat values as Covered Species would be included. In addition, under a Section 10(a)(1)(B) permit, a process to assure the maintenance and viability of the natural habitats of other species, Special Elements and PCAs would be established.

The conservation actions proposed under Alternatives B, C, and D were designed to serve both short-term and long-term needs. They include land acquisitions, conservation easements, land-use policies, monitoring, adaptive management, public information and education, habitat restoration and enhancement measures, and other conservation actions. The land-use policies include regulatory prescriptions, use restrictions, or other land management actions, and changes to underlying management policies. Such conservation activities would likely increase the chances of species persisting in Pima County.

Implementation of the action alternatives, particularly Alternative D, the Preferred Alternative, would set in motion several processes that are intended to enhance Pima County's environment over the long term. Without a Section 10(a)(1)(B) permit, the probability that contiguous, high-quality habitat on private lands would be systematically and perpetually preserved is lower than with a permit. Since there is an adequate amount of private land necessary to meet future development needs, those areas without sensitive species would most likely be developed opportunistically, without a conservation plan, and could leave undeveloped private lands with sensitive habitat too fragmented to provide sufficient high-quality habitat for long-term species protection. Also, without the dedicated funding required for a Section 10(a)(1)(B) permit, existing conservation management guidelines, which could benefit the long-term viability of species, may go unimplemented or be dropped under future BOS administrations. With a Section 10(a)(1)(B) permit, the primary objective of protecting sensitive species would also enhance the probability of preserving species for the long term.

Under Alternatives B, C, and D, the short-term and long-term impacts from the use of resources resulting from issuance of a Section 10(a)(1)(B) permit would be offset with the long-term maintenance, enhancement, and monitoring of conservation lands, as well as be consistent with local, State, and regional plans.

6.0 Coordination and Consultation

6.1 Public Involvement

6.1.1 Committees and Advisory Teams

A Steering Committee was assembled in 1999 to chart the process for development of the SDCP and issuance of a Section 10(a)(1)(B) permit. The Steering Committee consisted of representatives from the business community, environmental organizations, city and County government, State agencies, Tribes, and the ranching and mining communities. While all affected parties may not have been directly represented on the Steering Committee, a concerted effort was made to bring those interests to the table. The Steering Committee and its subcommittees met regularly and frequently through 2003 and submitted their SDCP/Section 10 permit recommendations to the BOS, which the BOS adopted in June 2003.

Technical Advisory Teams were assembled early in the process to direct and guide the development of the SDCP and Pima County MSCP to guarantee that the process was afforded the best available information, science, and expertise. Included were the following:

- Science Technical Advisory Team. This team was assembled to provide scientific information and guidance in developing the habitat and riparian elements of the SDCP, the CLS, monitoring and management guidelines, and the conceptual content of the Pima County MSCP.
- Ranch Technical Advisory Team. This team served to identify concerns relative to ranch land conservation and to develop means by which ranching and regional landscape conservation can be mutually supportive.
- Recreation Technical Team. This team was formed to provide guidance on how Pima County's growing demand for outdoor, natural resource-based recreational land uses should be considered in the context of regional landscape conservation.
- Cultural and Historical Technical Advisory Team. This team provided expertise on known and potential concentrations of cultural importance and their geographic relationship with the CLS, and identified a framework of measures for management and conservation of those resources in relation to the Pima County MSCP.

6.1.2 Scoping Issues and Concerns

6.1.2.1 Scoping Process

The process to identify the scope and content of the draft EIS for the Pima County MSCP was formally initiated on September 7, 2000 with the publication in the *Federal Register* (65 FR 54295) of the Notice of Intent to prepare an EIS. Public involvement meetings were held in the forum of open house/informational meetings on the following days and locations:

- October 4, 2000 at the Arizona–Sonora Desert Museum
- November 4, 2000 at Catalina Branch Library
- November 9, 2000 at River Center Branch Library
- November 14, 2000 at Picture Rocks Community Center
- November 15, 2000 at Marana Branch Library
- November 20, 2000 at Green Valley Branch Library
- November 20, 2000 at El Pueblo Center
- November 21, 2000 at Mission Branch Library
- November 22, 2000 at Woods Branch Library
- November 27, 2000 at Kino Recreation Center
- November 28, 2000 at Bear Canyon Library
- November 29, 2000 at Corrections Officers Training Center
- November 30, 2000 at Ajo Branch Library
- December 1, 2000 at Halberg Center (Avra Valley Fire Department)
- December 4, 2000 at Mary Dill School (Robles Junction)
- December 6, 2000 at Nanini Branch Library

At these meetings, information and maps were presented, issues were discussed, and written comments were received. Oral comments and questions were also taken, discussed, written down, and summarized.

Correspondence received during the initial public scoping meeting, during subsequent public meetings and in response to the draft Preliminary SDCP during the comment period (September 26, 2000 to January 1, 2001) included 172 letters and over 400 pages of comments and recommendations.

In addition, a public scoping meeting was held on October 4, 2003, prior to the release of an early draft Pima County MSCP. This meeting was preceded by the publication in the *Federal Register* (68 FR 53748) of a second Notice of Intent to prepare an EIS. Correspondence received during the comment period ending October 27, 2003 included 14 letters and 7 summary pages of comments and recommendations.

6.1.2.1.1 Multi-Species Conservation Plan

Pima County published the first draft MSCP in 2003. Subsequent drafts were published in 2005, in January and September 2006, 2008, and 2009 as part of the extensive process of developing scientific information and inviting public review and comment.

The Pima County Office of Conservation Science and Policy held a series of public meetings to discuss the draft MSCP released in December 2008. The meetings provided information on the plan, which furthers implementation of the SDCP and compliance with the ESA. Most of the meetings consisted of a staff presentation, followed by questions and answers. A total of 14 public meetings and presentations were held throughout the Tucson area.

- January 16, 2009, at the Pima Association of Governments, Transamerica Tower
- February 2, 2009, at the Federal Building
- February 2, 2009, at Oro Valley Public Library
- February 4, 2009, at Joyner-Green Valley Branch Library
- February 6, 2009, at the Pima Association of Governments, Transamerica Tower
- February 9, 2009, at Tucson Estates Community Center
- February 10, 2009, at Sam Lena-South Tucson Branch Library
- February 12, 2009, at U.S. Fish and Wildlife Service office (2 meetings)
- February 17, 2009, at Ellie Towne Flowing Wells Community Center
- February 20, 2009, at Pima County Public Works Building
- February 24, 2009, at Pima County Natural Resources, Parks and Recreation
- February 24, 2009, at Randolph Golf Course Clubhouse
- March 6, 2009, at Arizona Game and Fish Department, Phoenix office

Additional outreach included open house and presentation sessions in Oro and Green Valley, South Tucson, the Tucson Mountains, and at Academy Village on the far east side. Staff held a “brown bag” lunch presentation in the Pima County Public Works building. Other meetings had more specific audiences, such as presentations to the USFS staff, business leaders, the Regional Transportation Authority’s Wildlife Linkages Committee, the Tucson Basin Managers, the Environmental Planning and Advisory Committee, and the SDCP’s STAT. The Coalition for Sonoran Desert Protection held an open house, where Pima County staff gave a brief overview of the MSCP and heard comments and concerns from members of the environmental community.

In 2009, the main concerns heard were regarding the extent of coverage and the development of the monitoring plan. Public comment forms were available at the meetings, as well as online in various forms, including a survey that asked questions by chapter. Pima County received comments from 15 members of the public and 5 County

staff members. The comments were compiled and addressed in a 14-page document. Pima County used the feedback to help craft the final proposal of the plan.

An administrative draft MSCP was submitted to USFWS in December 2010. The administrative draft was made available to the public.

6.1.2.2 Public Scoping Meetings and Issue Identification

Nineteen public scoping meetings produced over 240 letters and written comments, and over 400 pages of comments (see Section 6.1.2.1.1). Section 6.3 contains a summary of these responses presented as a list of issues. Classifying comments into specific issues involves judgment and, therefore, the list does not reflect each comment exactly. The list is useful in identifying common issues of concern. Of the comments received during the initial (2000) scoping period, the topics of primary concern were: funding, private property, ranching, mining, cultural resources, water, the Pima County MSCP, and species concerns.

The comments received during the second (2003) scoping period echoed previous comments and raised concerns about the potential delisting of the pygmy-owl, the proposed bond initiative, potential zoning restrictions, the lack of a draft Pima County MSCP to review, and the desire for more detailed information on plan implementation, funding, costs, and restrictions on ranching and other land uses.

Public participation information and key issues identified by the public for the Pima County Draft MSCP and Draft EIS are described in Section 6.3 below.

6.1.2.3 Habitat Conservation Plan Permit and Regulatory Issues

The majority of the public comments discussed habitat conservation plan issues such as permits, regulations, alternatives, goals and scope, land use and growth, management and monitoring, mitigation, and reserve design. General habitat conservation plan issues included:

- use of management-oriented tools rather than reserves to achieve conservation goals
- relationship between the SDCP and habitat conservation plan
- more detailed documents
- inclusion of more detailed references
- process for determination of alternatives
- future requirements for monitoring ecological health of conservation lands
- future requirements for managing conservation lands
- cost implications of future requirements

- design of alternatives that consider economic growth, jurisdictional participation, voluntary participation of landowners, mineral resources, and current landownership and stewardship practices

A number of concerns emerged during the discussions about the possibility of linking the duration of the Section 10(a)(1)(B) permit to the species recovery and phasing the Section 10(a)(1)(B) permit and the benefits of developing the SDCP to address the permitting needs of the community. Concerns regarding habitat conservation plan regulations that were discussed included the issue that Memoranda of Understanding may not be binding enough and the comment that the SDCP should include a section on local, State, and Federal rules and regulations, and their potential effect on the SDCP. Another comment questioned the regulatory basis of SDCP elements that are not related to ESA compliance. The letters discussed the goals and scope of the Pima County MSCP. Some felt that the main goal should be minimal compliance with the ESA, while others emphasized the importance of ensuring the long-term survival of species.

Some comments questioned the inclusion of elements in the SDCP that are not within the scope of an MSCP, such as recreational and road improvements. Other comments focused on land use and growth, and the need to evaluate future land uses, as well as to evaluate the effect of outside growth on the Pima County MSCP. Comments included recommendations for a consolidated and improved Pima County Zoning Code to strengthen site analysis and land development requirements for both private and public works and in doing so, to stress an avoidance standard for important biological resources rather than primarily focus on mitigation for disturbance impacts.

Concerns with the MSCP management and monitoring plan were discussed, including the need to identify a detailed plan with funding. Other management and monitoring issues discussed the need to include plans to evaluate compliance, effectiveness, ecosystem functions, species-specific goals, and administrative boundaries that would relate to ecological boundaries for management areas. Support for using or enhancing current monitoring protocols, such as those of the Natural Resources Conservation Service, was expressed. Support was also expressed for the benefits of working within a regional framework such as that being developed by National Park Service biologists. Discussion of mitigation issues revolved around the need for off-site and on-site mitigation, and the importance of having all necessary mitigation funding in place before take and habitat destruction proceeds. The idea of establishing an independent conservancy to oversee management and monitoring for conservation lands was suggested.

Concerns were raised about the duration of the permit. One suggestion was to have a phased 20-year or longer permit period, with shorter incremental take thresholds, contingent upon meeting program benchmarks.

Discussion of reserve design comments focused on the establishment of hard-line boundaries and buffer areas, and identification of activities permitted in these areas. Other reserve design comments included the need for corridors and connectivity between reserve areas, strong riparian restoration plan, and focusing reintroduction efforts in areas that were previously occupied. In summary, concerns regarding the habitat conservation plan and process generated the majority of comments.

6.1.2.4 Science and Biological Resources

The science and biological resources topic generated species concerns, as well as opinions about the “best available science” used and the need for peer review. Species concerns focused on the question of which species would be covered under the permit and/or the need for detailed species recovery goals. Other species issues included the need to estimate levels of take, the need to monitor species survival, the need to document Pima County MSCP effects on species to show benefit and associated costs, and the need to include species that may potentially be listed in the next 20 years. Some people believe that big horn sheep (*Ovis canadensis*) should be included in the Pima County MSCP. Concerns about the cactus ferruginous pygmy-owl issue focused on the potential change in status of the species (later realized through delisting in 2006); the desire to not permit take for the pygmy-owl and critical habitat; the desire to expand the critical habitat designation to include lands in west Saguaro National Park; and the importance of relating the *Pygmy-owl Draft Recovery Plan*, critical habitat, and the Pima County MSCP. The exotic species issue included two comments that expressed the need to evaluate the long-term effects of tamarisk (*Tamarix ramosissima*) and the effects of other invasive species.

Concerns regarding scientific credibility ranged from those who believe the species analysis and the CLS represent the “best available science” to those who would like a built-in structure to provide for an independent and more thorough scrutiny of the data and analysis. A few commenters expressed concerns regarding incorrect and inconsistent maps.

6.1.2.5 Socioeconomic Considerations

Socioeconomic issues include economic impacts such as the overall cost and funding of the Pima County MSCP, the cost to taxpayers, concerns for private property rights, and potential restrictions and the effects of land use and growth. Concern for the uncertainty of a bond election in support of purchasing conservation lands was expressed during the public meetings, but the 2004 bond election was successful. Beginning in 2008, planning for future bond elections has been difficult given voter’s unease in approving new bonds during the current economic downturn. Other funding issues included the need for more details of permit funding including those of substantial long-term funding, identification of alternative funding sources, and a clear relationship between the SDCP funding mechanisms and the habitat conservation plan/ESA requirements for compliance.

Citizens were eager to know the boundaries of the Pima County MSCP preserve area on a parcel-by-parcel basis. Some believed that Pima County should provide notification for landowners that are affected by the Pima County MSCP through certified, registered mail. Citizens expressed their concern for the cost of the Pima County MSCP to private property owners, and their wish to have incentives included in the Pima County MSCP for participation. A primary concern among citizens was the protection of private property rights, property values, and a no net loss of private property under the Pima County MSCP without just compensation. Many citizens indicated that up-zoning and down-zoning decisions should be deferred until the Pima County MSCP has been developed.

Many commenters mentioned concern for jurisdictional issues such as compliance enforcement, effect of Pima County MSCP on activities in other jurisdictions, and the need to seek multi-jurisdictional cooperation with cities, Indian nations, counties, the State of Arizona, Mexico, and other entities.

6.1.2.6 Ranching

The ranching topic produced four issues of primary concern: ranch preservation, cooperation and compensation, public benefit, and possible negative effects of ranching. The ranch preservation issue generated comments that focused on the importance of State Trust Lands to ranching, and the importance of preserving ranching, as well as ranch lands. The cooperation and compensation issue generated comments focusing on the need to identify methods for incentives, management flexibility, and compensation for ranchers without reducing property values, as well as emphasizing the need for cooperation with ranchers for the Pima County MSCP to succeed. The public benefit issue was about the need to evaluate the public benefit of ranching and consider the extent to which it should be part of the Pima County MSCP. The possible negative effects of ranching issue included concerns from some citizens who feel that ranch land may be considered for conservation of open space, but that active livestock grazing is not compatible with long-term conservation of sensitive wildlife and vegetation. Concern was also expressed to evaluate alternative grazing practices and their subsequent impact on natural communities and species. Additional details about monitoring and management requirements of CLS lands and responsibility for mitigation costs were requested. Establishing conservation easements on private ranch lands with willing sellers was recommended as a primary tool to form the CLS.

6.1.2.7 Mining

The mining topic generated three issues of concern including mining and mineral rights, possible negative effects of mining, and economic impact. Comments regarding the first issue, mining and mineral rights, focused on the protection of mining operation and mineral rights, along with proper compensation for small and large mining claim holders that may be affected by the Pima County MSCP. The second issue, possible negative effects of mining, generated comments that were concerned with the potential impacts of

mining on sensitive lands; several citizens expressing the desire to keep mining operations outside of the Pima County MSCP reserve areas. The third mining issue—economic impact—generated comments concerning the economic impacts resulting from the potential for the Pima County MSCP to enforce limitations on the mining operations and mineral extractions. Restrictions on access, discovery, and development of mineral resources were specific concerns.

6.1.2.8 Cultural Resources

There are three primary issues surrounding the cultural resource topic: value, costs, and regulations. Comments expressed for the value of cultural resources focused on the educational value of cultural resources for schools, colleges, and tourists, as well as the value of unsurveyed areas that are likely to still hold cultural resources. A few commenters expressed concern about the cost to survey areas to determine cultural resources sites. The third issue, regulations, questioned how the USFWS would evaluate the current protection of cultural resources by existing Federal, State, and County regulations.

6.1.2.9 Water Resources

The three primary issues generated by the water topic included water quality, competition for water, and groundwater pumping. Citizens expressed concern that restoration of wash areas may lead to water contamination problems, and that future population growth will lead to competition for water for restoration efforts. Concerns were also expressed that any limitations on groundwater pumping are outside the scope of the Pima County MSCP.

6.2 Consultation with Others

The USFWS consulted with other Federal, State, Tribal, and local government agencies, as well as with non-governmental organizations. Consultations consisted of meetings and field trips. Pima County facilitated communication with government representatives by establishing a governmental working group with which to share information on the development of the Pima County MSCP and to engage support in the form of formal working agreements.

Other entities consulted with during the development of the EIS and Pima County MSCP are listed below.

Federal Agencies

- Bureau of Land Management
- Bureau of Reclamation
- National Park Service
- National Resource Conservation Service
- Fish and Wildlife Service National Wildlife Refuges

- U.S. Army Corps of Engineers
- U.S. Department of Defense
- U.S. Environmental Protection Agency
- U.S. Forest Service
- U.S. Geological Survey

Native American Tribes

- Ak Chin Indian Community
- Colorado Indian Tribe
- Fort Sill Apache Tribe
- Gila River Indian Community
- Hopi Tribe
- Mescalero Apache Tribe
- Pascua Yaqui Tribe
- Quechan Tribe
- Salt River Pima–Maricopa Indian Community
- San Carlos Apache Tribe
- Tohono O'odham Nation
- White Mountain Apache Tribe

State Agencies

- Arizona Department of Transportation
- Arizona Game and Fish Department
- Arizona State Land Department
- State Historic Preservation Office

Local Jurisdictions

- City of South Tucson
- City of Tucson
- Town of Marana
- Town of Oro Valley
- Town of Sahuarita

Other Participants

- Altar Valley Conservation Alliance
- Arizona Land and Water Trust
- Arizona–Sonora Desert Museum

- Center for Biological Diversity
- Coalition for Sonoran Desert Protection
- Defenders of Wildlife
- Diamond Ventures
- Metropolitan Pima Alliance
- Pima Association of Governments
- Sky Islands Alliance
- Southern Arizona Homebuilders Association
- Sonoran Institute
- The Nature Conservancy of Arizona
- Tucson Association of Realtors
- Tucson Audubon Society

6.2.1 Coordinating Requirements of the National Historic Preservation Act with the National Environmental Policy Act

USFWS actions require compliance with Section 106 of the NHPA. Section 106 compliance requires the Federal agency to take into account the effects of the undertaking on historic properties eligible to or listed in the NRHP, to consult with the State Historic Preservation Officer and affected parties, and to 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 the Pima County MSCP, which is required for the USFWS to issue to Pima County an Incidental Take Permit under Section 10 of the ESA. Pima County is pursuing the MSCP and Incidental Take Permit to address compliance with the ESA for various activities that Pima County proposes to undertake or permit that could result in the “take” of threatened or endangered wildlife. The purpose of the Incidental Take Permit is to authorize the incidental take of listed species, not to authorize or permit the activities that result in take.

The Advisory Council on Historic Preservation’s regulations require that agencies follow a compliance process described at 36 CFR 800, subpart B, to fulfill their obligations under Section 106 of the NHPA, and agency guidance within the USFWS requires compliance with the NHPA for its Federal undertakings. The USFWS, having determined that the issuance of an Incidental Take Permit is a Federal undertaking, has evaluated if the proposed action has the potential to cause effects on historic properties. While the

activities covered for take under an Incidental Take Permit can result in ground-disturbing activities that may affect historic properties, the issuance of an Incidental Take Permit does not actually authorize those activities. The USFWS has determined, pursuant to 36 CFR 800.3(a)(1) that the nature of the undertaking has no potential to cause effects to historic properties (Appendix A).

To ensure the USFWS's compliance with the National Historic Preservation Act, the American Indian Religious Freedom Act, and NEPA, the USFWS has advised Tribes in Arizona of this Federal undertaking proposed for non-Federal lands in eastern and western Pima County (Appendix B).

The intent of consulting with the Tribes is to provide the Tribal governments an opportunity to speak directly to Federal government officials about proposed Federal actions, in this case, the granting of the Section 10 permit. The USFWS has conducted three meetings with Tribal representatives to date, these include the following:

- Tohono O'odham Natural Resources Committee on June 14, 2012
- Tohono O'odham Cultural Resources Committee on August 18, 2012
- Four Southern Tribes Cultural Resources Committee on August 17, 2012 (Salt River Pima Maricopa Indian Community, Ak Chin Indian Community, Tohono O'odham Nation, and Gila River Indian Community)

County staff attended each meeting and provided information about the MSCP. The meetings were informational in nature, with the USFWS describing the more formal process for providing input and comments.

Actions within the County's MSCP would also be subject to review by the County Cultural and Historic Preservation office, which identifies any requirements related to cultural and historic resource protection as outlined under the County's Comprehensive Plan, their grading and rezoning ordinances, and the County BOS's Policy C 3.17. This process will ensure that historic and cultural resources are not destroyed or damaged. Based on this conclusion and information, the USFWS has complied with the Section 106 process.

6.2.2 Participation by Native American Tribes

Representatives of the Tohono O'odham Nation, the Pasqua Yaqui Tribe, and other federally recognized Indian Tribes and nations participate in efforts to conserve cultural and historic resources and important traditional cultural places in Pima County. USFWS regularly consults with Native Americans regarding cultural resources issues, and will continue to do so in the future (see additional detail above in Section 6.2.1). Pima

County will also continue to consult with Native American Tribes related to the Pima County MSCP and related documents.

6.2.3 Programmatic Consultation of Covered Activities for Clean Water Act Section 404 Compliance

Covered Activities under the MSCP would include the discharge of dredged and/or fill material into potentially jurisdictional WUS. The U.S. Army Corps of Engineers can use the MSCP as a vehicle to consult programmatically on effects to federally listed species that result from issuing certain permits under Section 404 of the Clean Water Act, to the extent that those permits address activities described in the MSCP and are located within the Section 10 Permit Area. The programmatic consultation on these Section 404 activities will be completed with the issuance of a Biological Opinion by USFWS (this will 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) and would replace the project-by-project species consultation process that the U.S. Army Corps of Engineers would use for “may affect” activities, thus streamlining the permitting process for Pima County and other entities in obtaining coverage under the MSCP. The specific permits that apply to Covered Activities are outlined in the MSCP (see MSCP Chapter 3, Section 3.5.1).

6.3 Public Participation and Review of Draft EIS

6.3.1 Publications

6.3.1.1 Notices

A Notice of Availability and Notice of Public Meetings was posted in the Federal Register on December 7, 2012 (77 FR 73045).

Pima County sent a notice of the Draft MSCP/Draft EIS availability and public meeting schedule to the Pima County Chairman and BOS on December 10, 2012.

6.3.1.2 News Releases and Public Mailings

Press releases were sent to local (Pima County) media outlets in December 2012 to announce the availability of the Draft MSCP/Draft EIS. Pima County also posted an announcement of the document availability for public review on the MSCP website (<http://www.pima.gov/cmo/sdcp/MSCP/MSCP.html>).

The USFWS posted the *Federal Register* notice and announced the availability of the Draft MSCP/Draft EIS on the Arizona Ecological Services website (<http://www.fws.gov/southwest/es/arizona/HCPs.htm>).

Pima County distributed a summary of the MSCP to an email list of approximately 200 people. Approximately 100 hard copies or CDs of the Draft MSCP/Draft EIS were also sent by mail.

6.3.2 Public Comment Meetings

The formal comment period for the Pima County Draft MSCP/Draft EIS was from December 7, 2012 to March 15, 2013. The USFWS held one public comment meeting for the EIS on February 21, 2013 (4:00 P.M. to 6:00 P.M.) in Tucson, Arizona. The USFWS presented information on the Draft MSCP/Draft EIS and took written comments. Written comments were also accepted until the close of the formal comment period.

Pima County hosted additional public meetings for the Draft MSCP. The meetings were as follows:

- January 14, 2013 4:00 P.M. to 7:00 P.M. at the Nanini Library, 7300 N. Shannon Road (District 1)
- January 28, 2013 5:00 P.M. to 7:00 P.M. at the Abrams Public Health Center, Room 1106-1108, 3950 S. Country Club Road (District 2)
- January 22, 2013 10:00 A.M. to 12:00 P.M., Robles Community Center, 16150 W. Ajo Way (District 3)
- January 24, 2013 4:00 P.M. to 6:00 P.M., Kirk-Bear Canyon Library, 8959 E. Tanque Verde Road (District 4)
- January 29, 2013 4:30 P.M. to 7:00 P.M., Pima County Housing Center, 801 W. Congress Street (District 5)

At each of the above meetings Pima County staff provided an overview presentation of the Draft MSCP, answered questions from the public, and provided informational materials.

6.3.3 Public Comment Analysis Process

During the public comment period, including the six public meetings as described above, 20 letters and written comments were received. Section 6.3.4 below contains a summary of the issues and USFWS responses. Classifying comments into specific issues involves judgment and, therefore, does not reflect each comment received exactly. The comment issue statements are useful in identifying common issues of concern. Of the comments received during the Draft MSCP/Draft EIS public comment review period, the topics of primary concern were the planning and decision making process, natural resources management, social and economic concerns, cumulative effects, and MSCP-specific issues.

To analyze the public comments received, the USFWS followed the USFS Content Analysis Team process for comment analysis. This process has been used to analyze hundreds of thousands of comments over numerous EISs and is a comprehensive and precise process to catalog and address public comments.

The content analysis process provides a systematic method of compiling and categorizing the full range of public viewpoints and concerns. In the analysis process, each public comment response was given a unique identifying number, which allows analysts to link specific comments to the original letter. Respondents' names and addresses were then entered into a project-specific database, enabling the creation of a complete mailing list of all respondents. The database is also used to track pertinent demographic information, such as Federal, State, Tribal, county, and local governments or government associations; business and industry groups; recreational organizations; and preservation, conservation, and multiple use organizations.

The coding process required identification of standalone comments. The coded comments were entered into the database. Comments were then organized into a narrative summary report, which provides a comprehensive list of public concerns raised during the comment period. The content analysis process does not treat comments as votes and cannot sway decision makers toward the opinion of individuals, groups, or pluralities. Content analysis ensures that every comment is considered with equal merit in the decision-making process.

Responses to public concerns are provided below in Section 6.3.4. Please note the following for the review of public concerns and responses:

- To the extent that two or more public concern statements are the same or very similar, the comments are grouped together and addressed in one response.
- For public concern statements that were characterized as applause, no response was prepared.
- For comments that only cast a preference for a particular alternative or a proposal with no justification, no response was prepared.
- For public concern statements regarding areas beyond the geographic range of this Draft MSCP/Draft EIS, no response was prepared.
- For public concern statements regarding subjects not pertinent to this Draft MSCP/Draft EIS, no response was prepared.

The public concern statements that follow are grouped by general subject. The reader is encouraged to review all the groupings to fully understand concerns on particular subjects. Public concern statements that follow are a representative summary only and do not represent all public concerns or all public comments submitted. The broad

categories are listed below in order of the issues identified by the public for Draft MSCP/Draft EIS.

All comment letters received were read, analyzed, and considered by the USFWS. Specific comments proved best in providing rationale for specific changes. The information provided by the public, whether specific or not, helped shape the Final MSCP/Final EIS.

Planning and Decision-Making Process

- Consultation and Coordination with Other Agencies
- Public Involvement Process
- Use of Best Available Science
- Adequacy of Analysis

Natural Resources Management

- Mapping/GIS
- Livestock Grazing
- Air Quality and Climate Change
- Cumulative Effects
- Water Resources
- Special Status Species

Social and Economic

- Use of Best Available Science
- Adequacy of Analysis
- Taxes

Cumulative Effects

- Transportation
- Changed Circumstances

EIS General

- Editorial

MSCP Specific

- MSCP Process
- Need for an EIS, Environmental Assessment

- Scope, Issues That Should/Should not be Addressed
- Alternative Development Method
- Alternatives Not Analyzed in Detail
- Suggestion for New Alternative

6.3.4 Public Comments and USFWS Responses

6.3.4.1 Planning and Decision Making Process

Consultation and Coordination with Other Agencies

Public Comment #22: *The Final Environmental Impact Statement (FEIS) should provide adequate information on the potential interface between the MSCP and Section 404 of the Clean Water Act including how jurisdictional waters will be identified over the permit term.*

USFWS Response: The USFWS consulted with the Army Corps of Engineers regarding Section 404 of the Clean Water Act. Based on that consultation, the Army Corps of Engineers determined that the MSCP permit would not affect the Section 404 (jurisdictional delineation) process. The MSCP Section 10(a)(1)(B) permit will result in streamlining of the regulatory aspects of the Section 404 process. The MSCP has been revised to provide more information about the interface between the In Lieu Fee mitigation under Section 404 and the MSCP mitigation.

Public Involvement Process

Public Comments #122, #123, #66 and #67: *The comment period for the MSCP and DEIS has been inadequate to allow for a thorough assessment by the public and interested parties.*

USFWS Response: The 90-day public comment period is established by Federal Regulations (43 CFR 1610.2 (e)). The public and interested parties were given notification equally, and all comments have been received and given equal consideration. The MSCP was made available to the public for review multiple times by Pima County via the MSCP website (<http://www.pima.gov/cmo/sdcp/MSCP/MSCP.html>), as well as at public meetings. The USFWS believes that the public participation process for the development of the MSCP and EIS has been extensive to date and the 90-day public comment period was sufficient. The Final MSCP and Final EIS will be available for a 30-day public protest period after publication.

Use of Best Available Science

Public Comment #25: *The Fish and Wildlife Service should use the best available science in evaluating the impacts of grazing and the merits of the proposed plan [grazing specific concerns].*

USFWS Response: The USFWS used the best available science to analyze the potential impacts of the proposed actions of issuance of a Section 10(a)(1)(B) permit for activities permitted or undertaken by Pima County (that vary by alternative). The proposed actions, as outlined in the MSCP, do not include changes to current livestock grazing permits. Grazing leases are permitted through the BLM and Arizona State Land Department, and animal unit months (AUMs) are set by these agencies. Pima County is not proposing any changes to the existing grazing leases as part of the Section 10(a)(1)(B) permit process. When compared to conditions on ranch lands prior to acquisition by the County, Pima County grazing management will likely reduce the impacts of grazing on these ranch lands due to grazing plans, guidelines, monitoring, and conservation actions.

Based on the review of public comments, additional information related to ranch infrastructure improvements has been added to Chapters 3 and 4 of the Final EIS.

Adequacy of Analysis

Public Comment #163: *There is no support for statements such as “without a Section 10(a)(1)(B) permit, the probability that contiguous, high-quality habitat on private lands would be systematically and perpetually preserved is lower than with a permit” and “...existing conservation management guidelines, which could benefit the long-term viability of species, may go unimplemented or be dropped under future BOS administrations.” These statements are subjective, conclusory, unsupported, politically charged, and should be deleted from the DEIS.*

USFWS Response: The paragraph mentioned in the comment has been revised to make it more consistent with the premise of the No Action Alternative. Avoidance, minimization, and mitigation measures may be an outcome of individual Section 7 or smaller HCP Section 10 permits; however, the cumulative adverse impacts or take on listed species may be greater than without the MSCP because of the fragmented approach to conservation and mitigation on a project-by-project basis rather than a regional- or landscape-level approach. With a regional permit, mitigation, monitoring and management for listed and unlisted species would be required. Without the dedicated funding required by a Section 10(a)(1)(B) permit, existing conservation management guidelines, which could benefit the long-term viability of species, may go unimplemented or be dropped under future BOS administrations. With a Section 10(a)(1)(B) permit, the primary objective of protecting sensitive species would also enhance the probability of preserving species for the long term.

Public Comment #6: *How will the existing government program affect the 44 species, and what are the specific species involved?*

USFWS Response: The 44 species proposed for coverage under the permit application are listed in Chapter 3, Section 3.3 (Biological Resources). The potential impacts of issuance of a 10(a)(1)(B) permit are analyzed in Chapter 4 of the EIS. Cumulative effects of past, present, and reasonably foreseeable future actions are found in Chapter 4, Section 4.18.

Public Comment #124: *The analysis of the DEIS and the impact of the permit on resources in Pima County is superficial and unsupported.*

USFWS Response: Based on the review of public comments, additional information and analysis has been added to Chapters 3 and 4 of the Final EIS.

Public Comments #139 and #140: *The DEIS should include community recreational amenities such as sports fields, swimming facilities, dog parks and playgrounds.*

USFWS Response: Additional Pima County Parks information has been added to Chapter 3, Section 3.11 Recreation. These parks include playing fields, pools, dog parks, river parks, sports parks, and shooting and archery ranges, managed by Pima County Natural Resources, Parks and Recreation. Smaller residential and commercial community recreational assets have also been included in the existing condition section.

6.3.4.2 Natural Resources Management

Mapping/GIS

Public Comments # 126 and #158: *The accuracy of the CLS maps is imperative, and the opportunity to make adjustments to maps based on field verification should be provided to ensure good foundation for determining mitigation ratios.*

USFWS Response: Pima County's CLS maps were not developed as habitat maps or to show details related to specific projects. The CLS is a compilation of biological reserve design considerations that include more than potential habitat. The STAT adopted a policy in 2009 for revision of the CLS, which states in part:

it would be incorrect to base revision of the Conservation Lands System upon new habitat suitability models alone. The Science Technical Advisory Team reiterates its recommendation that any revision of the Conservation Lands System be based upon a similarly comprehensive review of available biological data, including fine-filter and coarse-filter information as well as review of the principles of reserve design by a similarly constituted advisory body.

The CLS map is not subject to modification as the comment suggests. The CLS map was adopted into policy as the Regional Environmental Element of the Pima County Comprehensive Plan Update. Modification to the CLS map would be processed as a comprehensive plan amendment. Comprehensive plan amendments are mandated to allow for public review and comment. Public comments related to changes or adjustments to CLS maps would be considered at that time.

The MSCP mitigation ratios will not be adjusted. The MSCP mitigation ratios should not be confused with those imposed by the Pima County Board of Supervisors on projects going through plan amendments and rezonings. The Board may accept a lower amount of mitigation during those processes.

Livestock Grazing

Public Comments #25, #26, #27, #29, #30, and #35: *Pima County has failed to consider impacts of livestock grazing on its mitigation lands. The EIS fails to discuss livestock related “take” of imperiled species, trampling, herbivory and soil disruptions, water degradation, altered fire regimes or livestock management strategies for mitigation lands.*

USFWS Response: Details on the reasons for excluding livestock grazing (herbivory) from the MSCP can be found in Chapter 3, Section 3.4.1.4 (Ranching Activities) of the MSCP. Based on consultation with Pima County, the USFWS determined the maximum utilization under existing grazing leases would not be affected by the MSCP proposed actions. In addition, Pima County is not proposing any changes to grazing permits. Therefore, there is no Federal action (permit, funding, or Federal land management decision) that would trigger NEPA analysis of grazing as it related to issuance of a 10(a)(1)(B) permit.

NEPA's procedure requirements apply to a Federal agency's decisions related to their proposed actions. In the case of the Pima County MSCP, the proposed action is the issuance of a Section 10(a)(1)(B) permit, not a permit for a grazing lease or changes to grazing management. The issuance of the permit under the proposed alternatives would not change the existing effects of grazing on the landscape. No incremental change in grazing would occur, with or without the issuance of the permit.

As stated in Chapter 3, Section 3.4.1.4 (Ranching Activities) of the MSCP, Pima County could request an amendment to the Section 10(a)(1)(B) permit if, in the future, implementation and monitoring indicate that coverage for livestock grazing is appropriate. If necessary, Pima County could also seek Section 7 consultation for any future changes or requests for grazing leases on Federal lands.

Public Comments #28, #31, #34, and #59: *The DMSCP fails to adequately address the direct impacts of livestock-related infrastructure and grazing on the species and landscapes in the mitigation lands.*

USFWS Response: The MSCP provides an adequate description of infrastructure improvements that may occur during the permit period (MSCP Chapter 3, Section 3.4.1.4 Ranching Activities). Based on the review of public comments, additional information related to ranch infrastructure improvements has been added to Chapters 3 and 4 of the Final EIS. The proposed infrastructure improvements do not include proposals to renew or revise current grazing leases. All proposed infrastructure improvements would be subject to avoidance and minimization measures as described in the MSCP, as well as be included in ranch CRMPs or comparable ranch management plans. The issuance of the permit under the proposed alternatives would not change the existing effects of grazing on the landscape and no incremental change in grazing would occur, with or without the issuance of the permit; therefore, no cumulative impacts from livestock grazing would occur from issuance of a Section 10(a)(1)(B) permit.

Public Comments #33 and #36: *The EIS fails to address impacts on sensitive species caused by livestock infrastructure such as fencing, stock water, and cattleguards.*

USFWS Response: As discussed in the response to comments above, the issuance of the permit under the proposed alternatives would not change the existing effects of grazing on the landscape; therefore, no cumulative impacts from livestock grazing would occur from issuance of a Section 10(a)(1)(B) permit. Based on the review of public comments, additional information related to ranch infrastructure improvements has been added to Chapters 3 and 4 of the Final EIS.

A summary of the Burkett and Thompson 1994 reference provided by the commenter was reviewed. This reference provided both adverse and beneficial effects of water developments, including the spread of non-native species (adverse), as well as the increase in abundance of small mammals, raptors, and reptiles and amphibians (beneficial). The articles related to fence impacts on wildlife were also reviewed.

Pima County has adopted, and is currently implementing, the AZGFD standard guidelines for wildlife-friendly fencing. Pima County has been developing waters that use both wildlife-friendly standards and livestock standards. For livestock, waters are developed with escape ramps (or retrofitted with ramps). These measures are all part of mitigation and avoidance standards adopted by Pima County for ranch management.

Public Comments #41, #42, and #52: *The “Affected Environment” section of the EIS is biased and unsupported in its discussion of ranching and agriculture and has therefore failed to follow NEPA mandates. Pima County has neglected to discuss the adverse impacts caused to landscape and wildlife species by livestock activities.*

USFWS Response: Pima County reviewed the recommendations presented in the May 2001 document prepared by the Coalition for Sonoran Desert Protection, entitled *Livestock Grazing and the Sonoran Desert Conservation Plan*. At least 11 of the 15 recommendations have been fully or partially implemented, these are identified in bold below.

1. **Establish a core and corridor reserve free of livestock grazing.** The SDCP did not establish areas free from grazing, nor was it intended to do so, as ranch conservation is one of the central elements of the SDCP. However, Pima County, USFS, Bureau of Reclamation, USFWS, National Park Service, BLM, Department of Defense, and various private property owners have all maintained certain areas free from livestock grazing in Pima County for years.
2. **Establish an adaptive grazing management program for areas outside the core and corridor reserve.** Pima County has, as part of the SDCP, implemented protections for environmentally sensitive resources and monitoring of range conditions inside the biological reserve. The MSCP would further strengthen this program.
3. **Pursue conservation classification and lease or purchase of Arizona Preserve Initiative State land.** Pima County has, under the SDCP, sought and acquired State land through the Arizona Preserve Initiative. These areas include Tumamoc Hill, Valencia Archaeological Site, and Tortolita Mountain Park Expansion Phase I. Pima County will pursue additional expansion of this park, although the Arizona Preserve Initiative is no longer accepting new reclassification applications.
4. **Implement land use regulation to protect ranch land.** Pima County has repealed the Vail-Posta Quemada Zoning Plan, which applied to the area south of the Rincon Mountains and north of Interstate 10. Pima County's lot splitting ordinance and procedural improvements have reduced illegal lot splitting. The adoption of the 2001 Pima County Comprehensive Plan and the 2005 Guidelines of the Maeveen Marie Behan Conservation Lands System have also protected ranch land from urban encroachment.
5. **Pursue retirement of grazing in the core and corridor reserve.** Ranches acquired and managed by Pima County without cattle grazing include the Canoa Ranch, Posta Quemada, portions of Empirita Ranch, and Hayhook Ranch, as well as many other bond-funded acquisitions. Actual retirement of the grazing lease associated with Hayhook Ranch can only be accomplished with consent of the BLM. This BLM lease in the Coyote Mountain Wilderness is currently maintained under a non-use status.
6. **Achieve ESA conservation standards.** The USFWS is preparing to issue the Section 10 permit. The proposed MSCP meets the requirements of the ESA. The

ranch management agreements give Pima County the flexibility needed to assure that Covered Species can be conserved.

7. **Do not establish a program of certainty for federal land grazing allotments.** Pima County has not done so.
8. **Establish a program of certainty for State land grazing allotments.** Pima County's ranch conservation program provides assurance that the fee title properties will not be released for urban development, but only acquisition of the State land can provide certainty. Pima County's comprehensive plan and the guidelines of the Maeveen Marie Behan CLS reduce the potential for State land in the CLS to be developed into satellite communities.
9. **Pursue a purchase of development rights program.** Pima County has established a purchase of development rights program for ranches, as well as a transfer of development rights program for developers. The ranch conservation program includes the establishment of conservation easements. The easements do not require that grazing will be discontinued, but do not prohibit such.
10. **Do not establish a means to compensate ranchers for decreases in value of grazing leases based on certain stocking rates.** Pima County has not done so. Since, in most cases, the current operators were the previous State lease holders, the County paid ranchers for the value of the State grazing lease at the time the ranch was acquired. Also, the ranch is now owned by the County and the operators do not have to pay personal property taxes on the ranching improvements, further lowering the basic ranch operating expenses.
11. **Pursue establishment of new property tax law conservation classification.** Pima County and others have over the years pursued this idea without success. Only the State of Arizona can authorize such a classification, and to date, the State has not done so.
12. **Do not pursue increased flexibility in state law for agricultural lands tax status.** Only the State can authorize any change to property tax status.
13. **Establish grass banks under certain stringent conditions.** To date, Pima County has not established grass banks, in part because the county shares some of the same concerns expressed in the comment. This is an option that the County sees as a viable management approach when the regional conservation need is established and under the right management conditions.
14. **Establish other incentives for removal of livestock in the core and corridor reserve.** The County ranch management program is not based on livestock removal but rather emphasizes conservation management consistent with both cultural and

biological goals of the SDCP. The County presently has the tools to limit and/or temporarily remove livestock use within lands managed in the core and corridor reserves when conditions indicate that this is a necessary action.

15. **Establish new revenue sources to secure the core and corridor reserve.** This has not been achieved. The MSCP proposes to use the general fund to manage and monitor mitigation lands.

Public Comment #55: *Pima County's goal of keeping "ranchers ranching" is purely sentimental and not based in and objective or quantifiable measure of significance as agriculture falls under the lowest sector of all industry employment.*

USFWS Response: As stated in the Draft EIS, page 3-71:

As one of the six elements of the SDCP adopted by the Pima County Board of Supervisors, the value of ranch conservation has been acknowledged as an important conservation element in its own right. Moreover, by including ranch lands as a productive working landscape worthy of conservation, Pima County formalized its commitment to ranching as an important land use and to keep ranchers ranching.

Ranch conservation is an element of the SDCP, not the MSCP. The proposed actions under the MSCP include ranch infrastructure improvements, which are discussed and analyzed in the EIS.

As part of the MSCP, Pima County has recognized the value of ranch land in the context of conservation opportunities in the region generally and in mitigation for impacts to species specifically. The greatest opportunity to purchase and lease mitigation lands is on active cattle ranches. Without the active support of the ranching community during the SDCP process, it is unlikely that Pima County would have had the opportunity to acquire the significant number of acres currently available as mitigation lands.

Public Comment #43: *Pima County should immediately suspend grazing on all lands that are secured through land exchange or purchase to the county.*

USFWS Response: Pima County has acquired and managed grazing lands as part of the conservation tools for the MSCP (see MSCP Chapter 5, Section 5.2 Ranchland Management). Pima County implements grazing standards and guidelines for all ranch lands under its control and will continue to manage ranch lands to minimize the impacts of grazing. Based on criteria stated in the standards and guidelines, non-use (removal of grazing) may become appropriate, particularly if livestock grazing is shown to reduce the conservation value of grazing lands receiving credit as mitigation under the MSCP and permit requirements. The Pima County grazing standards and guidelines are implemented to maintain resilient ecosystems while also following the guidelines and

rules related to grazing lease requirements. Also, see Response to Comment #41 for additional information related to non-use of grazing leases.

Public Comment #46: *It is unclear in Table 4.7 of the DEIS (at 4-226) whether the acre of “state lease” lands listed under “Mitigation to Date”, is being credited at the 25-percent or 100 percent rate.*

USFWS Response: The acreage reported in Table 4.7 is at the 100-percent rate because these are fee title lands with conservation easements, which have been conveyed to Pima County. For these lands, Pima County has received rights that allow enhanced conservation and augmented monitoring and management. A note has been added to the table and text to clarify the percentage reported for these lands.

Air Quality / Climate Change

Public Comment #56: *The DEIS lacks a discussion of impacts on air quality from livestock grazing concentration areas and their infrastructure and construction.*

USFWS Response: As discussed in the response to comments 30 and 31 above, the issuance of the permit under the proposed alternatives would not change the existing effects of grazing on the landscape or on air quality; therefore, no direct or indirect impacts to air quality from livestock grazing would occur from issuance of a Section 10(a)(1)(B) permit. Based on the review of public comments, additional information related to ranch infrastructure improvements has been added to Chapters 3 and 4 of the Final EIS.

Public Comment #44: *The proposed plan fails to adequately address climate change resilience, as well as the impacts of livestock grazing on climate change.*

USFWS Response: As discussed in the response to comments 30 and 31 above, the issuance of the permit under the proposed alternatives would not change the existing effects of grazing on the landscape. As part of the SDCP, Pima County analyzed the effects of climate change in the “Climate Change and Natural Resources in Pima County: Anticipated Effects and Management Challenges” report (2010). Pima County modified ranch management programs in cooperation with ranch partners to reduce herd sizes in response to climate-related issues, particularly drought. The size and diversity of ranch land conservation under the MSCP have contributed to Pima County’s ability to respond to climate change resilience overall. Pima County is also promoting ecosystem resilience and other tools to reduce impacts to sensitive resources on County-controlled lands.

Water Resources

Public Comment #65: *It should be added that parts of the Santa Cruz River in Pima County are identified as not attaining for exceedances of ammonia. This can impact the*

issuance of a Clean Water Act Permit, as Pima County is to reduce total nitrogen and ammonia under a compliance schedule in its Arizona Pollutant Discharge Elimination System permit.

USFWS Response: There have been exceedances of the Aquatic and Wildlife Water Quality Standard for effluent-dependent waters for ammonia in the Santa Cruz River in Pima County. In response, Pima County has undertaken significant upgrades to the two treatment plants. These upgrades will eliminate ammonia toxicity on or before January 20, 2014 and January 30, 2015 for facilities located at Ina and Roger roads, respectively. These are considered "Covered Activities" for the purpose of the Section 10(1)(a) permit. In recognition of the substantial progress that Pima County has already made in rectifying ammonia problems, ADEQ's Water Quality Director has written a letter to the U.S. EPA dated April 8, 2013 requesting EPA to not list the effluent-dependent Santa Cruz River in Pima County on the 2010 303(d) list.

Public Comment #129: *It should be included in the DEIS that Tucson Water has recently forgone taking the full entitlement of CAP water and is likely to do so again in the future.*

USFWS Response: Water use within Pima County is an important issue that affects the population, habitats, and future uses of land. Tucson Water and other local water providers in the Tucson area are increasingly taking their full CAP allocations. In 2010, local water providers took delivery of 107,543 acre-feet or 55 percent of their CAP allocation. In 2011, those numbers were 145,587 acre-feet and 74 percent, respectively. In 2012, water providers took 166,748 acre-feet or 85 percent of their allocation. Tucson Water's use of CAP has increased from 65 percent in 2010 to 86 percent in 2011 and 100 percent in 2012. CAP deliveries can be found at the Central Arizona Water Conservation District's website under Water Operations/Deliveries. See <http://www.cap-az.com/index.php/departments/water-operations/deliveries>.

The Groundwater Users Advisory Council has convened a Safe Yield Task Force to develop recommendations for how the Tucson Active Management Area can achieve safe yield by 2025, including full CAP utilization and optimum utilization and comprehensive management of effluent. See these websites for additional information: http://www.sawua.org/SYTF/library/110516_SYTFreport2GUAC5_16_11.pdf and <http://www.sawua.org/SYTF/SYTF.htm>.

Public Comment #162: *Supporting documentation should be provided for the statement "the reduction of water supply is likely to be the greatest under Alternative C." While environmental benefits of water conservation and riparian restoration are important, the DEIS should prioritize sufficient water resources for humans.*

USFWS Response: The reduction of water use identified in the comment is related to conservation easements on ranch lands (MSCP mitigation lands). As stated in the

MSCP, management agreements between Pima County and tenant ranchers restrict the permitted uses of water on County-controlled ranch lands to the amount required for the cattle ranching operation on the property, and provide for restrictions of potable use should the water exceed state standards (see also MSCP Appendix I). These restrictions would not affect the availability of water to municipalities or water providers in Pima County in any way.

Special Status Species

Public Comments #14, #61, and #62: *The lesser long-nosed bat requires 5,320 acres for a home range according to biologists. The minimum patch size for 250 pairs is approximately 1,330,000 acres. The minimum number of patches for this species in the reserve system is 10, therefore, the population viability goal is to conserve at least 13,300,00 acres in order to maintain a viable population. This is a major problem that ignores the fact that Pima County has a total acreage of only 5, 800,000 acres. In addition the bat truly has no “home range” but follows its food along nectar corridors between Mexico and the United States Conclusion: The calculations are inherently flawed due to data misrepresentations fed into the models and conclusions developed within the models while ignoring the reality of the bats life cycle and migratory habits.*

USFWS Response: The Priority Vulnerable Species Report and the calculations mentioned in the comments were not used in decisions related to lesser long-nosed bat in the MSCP. Neither of these sources are cited in the MSCP.

Public Comments #32, #37, #38, #39, and #40: *The impacts of grazing, and livestock infrastructure on wildlife including the Merriam’s mouse, Pima Pineapple Cactus, and Southwestern Willow flycatcher should be discussed in further detail in the EIS, as well as comprehensive management plans for any new infrastructure projects.*

USFWS Response: As discussed in the response to comments 30 and 31 above, the issuance of the permit under the proposed alternatives would not change the existing effects of grazing on the landscape or special status species; therefore, no direct or indirect impacts to special status species from livestock grazing would occur from issuance of a Section 10(a)(1)(B) permit. Based on the review of public comments, additional information related to ranch infrastructure improvements has been added to Chapters 3 and 4 of the Final EIS.

6.3.4.3 Social and Economic

Use of Best Available Science

Public Comments #53, #131, #141, #142, #144, #148, #150, #183, #184, #185, #186, #187, #188, and #191: *The DEIS has many outdated facts and references, the FEIS should have updated, current information presented to support the sections mentioned.*

USFWS Response: Updated U.S. Census, as well as Pima County-specific information was reviewed and incorporated into Chapter 3, Section 3.13, Socioeconomics of the Final EIS. Tables 3.9 and 3.10 have been updated with more current data. In addition, public comments providing updated information or references were reviewed and incorporated, when relevant.

Public Comment #54: *The EIS should acknowledge the dominant ecological impacts of livestock grazing and should not use unsubstantiated economic claims to support such agricultural activities; this is against requirements of the National Environmental Policy Act.*

USFWS Response: Pima County implements grazing standards and guidelines for all ranch lands under their control and will continue to manage ranch lands to minimize the impacts of grazing. Based on criteria stated in the standards and guidelines, non-use (removal of grazing) may become appropriate. The Pima County grazing standards and guidelines are implemented to maintain resilient ecosystems while also following the guidelines and rules related to State Trust Land requirements. See Response to Comments 26, 29, and 30.

Adequacy of Analysis

Public Comment #125: *Standard EIS impact review protocols from the NEPA handbook and other policy guidance should be followed.*

USFWS Response: The USFWS NEPA Handbook contains checklists for preparing environmental documents, including a checklist for social and economic impacts. These checklists are used as a tool to assist in the development of impact analysis and are not specific to Council of Environmental Quality or NEPA policy. These checklists were used in the development of the social and economic sections of the Pima County MSCP EIS.

Public Comments #132, #133, #134, #143, #145, #146, #147, #149, #151, #152, #153, #155, #159, #160, #180, #181, #182, #189 and #190: *The DEIS lacks a thorough, up-to-date, accurate analysis of urban land use, population and construction and housing markets, mining and others. The implementation of such a comprehensive environmental program lacks appropriate consideration for business interests and potential impacts on our economy.*

USFWS Response: Information provided in these comments was taken into consideration and incorporated, where relevant (see Chapter 3, Section 3.13, Socioeconomics of the Final EIS). Chapter 3 of the EIS has been updated with new data, including Section 3.13.1.2, which has been revised with current information and data.

Public Comment #136: Discussion should be added about the dependency of the project development area over the life of the permit on natural market conditions and the regulatory environment, both of which are highly fluid and variable.

USFWS Response: The acreage of total impacts (development area) was derived from the land absorption model, based on projection of urban growth as described in the MSCP Appendix G.

Public Comment #154: A section should be added to discuss the positive economic contributions housing and development have on the region, as well as an analysis of any impacts the proposed alternatives would have on the housing market and development industries.

USFWS Response: Additional information related to socioeconomics has been added to Chapter 3, Section 3.13, Socioeconomics. Please refer to Chapter 4, Section 4.14 for the analysis of impacts of the issuance of the Section 10(a)(1)(B) permit on socioeconomics.

Taxes

Public Comment #11: As demands for infrastructure and services increase, so do tax rates.

USFWS Response: Socioeconomic existing conditions, including tax base, are discussed in Chapter 3, Section 3.13, Socioeconomics. Please refer to Chapter 4, Section 4.14 for the analysis of impacts of the issuance of the Section 10(a)(1)(B) permit on socioeconomics, including taxes.

6.3.4.4 Cumulative Effects

Transportation

Public Comment #138: Discussion of planned road projects during the life of the permit, and impacts associated with these plans should be added. In addition, contributions from the development industry should be considered in regards to transportation infrastructure improvements.

USFWS Response: Cumulative impacts analysis was revised based on new and updated information for Chapter 3, Affected Environment, and Chapter 4, Environmental Consequences.

Changed Circumstances

Public Comment #86: *The provisions on changed circumstances should analyze further the impacts from the proposed Rosemont Mine and should also offer climate change adaptation measures specific to the covered species.*

USFWS Response: In their review of the internal draft, USFWS advised the County that changed circumstances should be generalized to accommodate a variety of new projects that might be anticipated in the 30-year life of the permit. The projects mentioned in the comment are already being considered in the Federal process.

6.3.4.5 EIS—General

Editorial

Public Comments #58, #130 and #135: *The EIS has multiple errors in names and information including sections 3-19, 3-20, and in table 3.4.*

USFWS Response: The USFWS has provided clarifications and modifications to the Final EIS, as needed and appropriate, based on reviews and public comments.

6.3.4.6 MSCP Specific

MSCP Process

Public Comments #15, #16 and #64: *The Permit Area includes mostly federal and state lands which greatly decreases the effectiveness and feasibility of the habitat conservation plan.*

USFWS Response: A majority of the Permit Area is State land. These lands would only be included if they were turned over to the private sector for development or to the County for conservation and may not currently contribute to the effectiveness of the MSCP (except for those State land leases currently managed by the County). Size and scope of County-managed lands contribute to rather than diminish the effectiveness of the conservation plan. Most of the Covered Species are also found beyond the borders of the County; however, much can be done to mitigate for Covered Activities and to do conservation work within the County. The Permit Area does not include Federal land.

Public Comment #69: *The MSCP will need greater clarity and specificity in order to comply with the Endangered Species Act, be consistent with the FWS HCP Handbook (1996), and ultimately be a more successful Habitat Conservation Plan than those in the past.*

USFWS Response: The USFWS has determined that the MSCP plan is not deficient with regards to the HCP Handbook and the level of specificity is appropriate for this

stage of the HCP process. Pima County will provide more information throughout the MSCP permit period and will continue to work closely with the USFWS, as well as interested groups to refine the level of specificity during the initial period of the MSCP's implementation.

Public Comment #73: *The MSCP should clearly state to the concerned public that the FWS has the opportunity to review and concur or disagree with the County's MSCP-related general fund allocations. The estimated budget for the "mitigation lands management" line item must accurately reflect the anticipated increases in management costs for mitigation lands the County anticipates acquiring and/or conserving.*

USFWS Response: The MSCP annual reports will be available to the public. The USFWS will review the annual reports and provide comments to Pima County. Under the MSCP, Pima County has made a commitment for management of the mitigation lands. If the County does not allocate the necessary funds and the quality of management drops below the standards set by and reviewed by USFWS, the Section 10(a)(1)(B) permit would be in jeopardy. Any cost estimate at this point would likely require annual adjustment to allocations to meet the programmatic needs over the life of the permit.

Public Comment #87: *The County should consider refining the PCAs upon permit issuance, and continue to update and refine on a 10 year cycle prior to FWS reviews.*

USFWS Response: The MSCP has been revised to include the STAT policy regarding how the PCAs and habitat models can be revised (Final MSCP Appendix Q). This measure would only be undertaken if it was deemed necessary by the USFWS and Pima County and with STAT's concurrence.

Public Comments #107, #108 and #194: *The MSCP does not define a specific process through which a private or other development can receive a permit for take authorization, and lacks a precise mechanism and process for private participation concerning ESA permitting.*

USFWS Response: Based on direction from USFWS, specific details describing how Pima County will document coverage for impacts from private development is not required in the MSCP, only that the County clearly document that impacts from Covered Activities are adequately addressed through the processes outlined in the MSCP and permit. Pima County has assured the USFWS that it will employ policy-making and regulatory authorities to create and memorialize those implementation process(es) necessary to provide incidental take coverage to development on private property. In keeping with its commitment to maintain transparency in the development and implementation of the MSCP, the County will engage stakeholders and other interested members of the public in a timely manner as policy and regulatory mechanisms are developed. Criteria and conditions applicable to private development in order for

coverage to be granted are detailed in Sections 3.4.1.1, 4.4.2, 4.5.1.7, 4.5.2, and 6.4 of the MSCP.

Public Comment #109: *The MSCP lacks necessary detail on the impacts analysis and mitigation process and therefore does not allow for meaningful public review and comment.*

USFWS Response: The MSCP has been revised to clarify that impacts from the development of a project on private property are eligible for permit coverage regardless of whether Pima County approved that project before or after adoption of the CLS. Appendix B has been added to clarify how CLS mitigation obligations and credits will be determined. The legal requirements of the USFWS's HCP program do not obligate Pima County to explain the rationale behind the cap on acres of impact or the ratio that is to be used to determine acres of mitigation. See also Response to Comment #67 related to the MSCP and DEIS public involvement and public comment period.

Public Comment #121: *Including a detailed list of County ordinances, regulations and policies (the "Controlling Documents"), the County is making itself less flexible to amending any of these Controlling Documents in the future for fear of jeopardizing the permit. This rigidity does not allow for expected change that will occur over time.*

USFWS Response: Section 4.2 of the MSCP describes a process for obtaining the USFWS's opinion about whether proposed changes to those elements of certain ordinances, guidelines, and protocols would adversely affect the County's incidental take permit. The USFWS's opinion would be available to the sitting Board of Supervisors as they decide whether to execute the proposed modification. This practice would not impact future sitting Boards of Supervisors' rule-making flexibility.

Public Comment #165: *The monitoring protocols presented in the MSCP lack sufficient detail to explain how implementation of monitoring will occur.*

USFWS Response: Developing an adequate ecological monitoring approach is an iterative process, and additional details on monitoring protocols will be developed in the future as part of an adaptive management process evaluating the effectiveness of the monitoring program to document effects from Covered Activities. The intent of protocols is to provide enough information so that it can be repeated. The County has committed to taking this important standard very seriously.

Public Comment #168: *The MSCP should clarify if any specific uses of the monitoring results are intended and if there are thresholds in occupancy rates that trigger particular management actions for each species monitored.*

USFWS Response: USFWS will discuss responses to observed changes with Pima County to determine the best course of action. Under an adaptive management process,

the results of monitoring will be evaluated and impacts analyzed. If impacts from Pima County Covered Activities are detected, conservation actions may be triggered. Based on the adaptive management evaluation process, conservation measures would be implemented as needed.

MSCP Funding Plan

Public Comment #112: *The MSCP Funding Plan does not account for the possibility that the County may have to fund the replacement for State Trust Lands lost to leases not being renewed.*

USFWS Response: Table 7.1 of the MSCP obligates Pima County to replace such losses with additional CLS land, thus allowing for "reimbursement" of lost mitigation lands. Pima County believes that it will be able to maintain an adequate inventory of eligible mitigation land to compensate for loss of one or more leases without additional funding beyond what is already discussed. USFWS will meet and coordinate with Pima County if an issue arises. In coordination with the USFWS, the amount of take covered by the permit can be reduced if an imbalance occurs. This simply means that if the County cannot replace lost mitigation lands, the permit coverage is reduced to be in line with the mitigation the County can provide. This would require a permit amendment.

Public Comment #113: *The MSCP should be precise about the expected fees and other charges that will be applied to those choosing to opt in to MSCP coverage. The lack of details on the Funding Plan does not allow for substantive comments on the fees and other charges or measures expected.*

USFWS Response: Criteria and conditions applicable to private development in order for coverage to be granted are detailed in Sections 3.4.1.1, 4.4.2, 4.5.1.7, 4.5.2, and 6.4 of the MSCP. The MSCP has been revised to clarify that, in addition to the application fee, a private property owner who chooses to opt in will be assessed a compliance monitoring fee only if the development provides a Natural Open Space Set-aside to achieve compliance with the CLS. These Natural Open Space Set-aside lands will be designated as Mitigation Land. MSCP Section 4.5.2 identifies all fees that a private property owner will be assessed in order to receive incidental take permit coverage, establishes a fee cap (in 2013 dollars), identifies those Pima County services for which fees are being collected, and provides reference to State Statute that authorizes the County to assess such fees.

Public Comment #73(2): *The MSCP should identify how much of the multi-jurisdictional RTA Critical Landscape Linkages funding the County expects to utilize for mitigation.*

USFWS Response: An estimate cannot be provided because Pima County does not control how the Regional Transportation Authority funds are disbursed. The \$45 million allocation will be spent for research and infrastructure located within the MSCP Planning

Area. Benefits to Covered Species in the Permit Area will depend on the design and exact location of the projects. The Sonoran desert tortoise, mesquite mouse, and various bat species may in particular see benefits. However, any credits from the Regional Transportation Authority projects related to MSCP Covered Activities or species mitigation credits will be determined on a case-by-case basis as appropriate.

Biological/Conservation

Public Comments #1 and #3: *The language in the 9th bullet point on page 61 of the conservation plan is much too broad and could be interpreted to prohibit trail use based on subjective criteria. This should be revised to require impacts to be defined by scientific analysis as a basis of changes in trail access.*

USFWS Response: As part of the MSCP, Pima County made it a priority to make most mitigation lands accessible to the public. USFWS and Pima County believe that low-impact trails and trail uses are largely compatible with the stewardship tenants of the MSCP. However, these properties will be managed for their conservation value. As such, Pima County will reserve the right to minimize the development of trails and to minimize “wildcat” trails so that protection of the environment is the highest priority.

As part of the normal trail planning process by Pima County under the MSCP, potential impacts from trail projects to biological and cultural resources will be evaluated more comprehensively in the future. The decisions on location, design, re-routing, and density will be site-specific and based on scientific and social evaluations. The basic management techniques of avoidance and minimization will be applied to mitigate potential impacts.

Public Comments #2 and #4: *The 12th bullet point on page 61 of the MSCP should be revised to include mountain biking and horseback riding as recreational uses as these activities have no more impact than hiking and hunting.*

USFWS Response: Under the MSCP, trail development and use that includes mountain biking and equestrian riding will be considered in management of each preserve. The vast majority of trails developed by Pima County are done as multiple-use trails. Like all other uses, off-trail activity would be more closely managed, as necessary, to protect the mitigation values established for the specific property.

Public Comment #8: *The County should reduce the amount of take permitted and instead divert development away from sensitive habitat lands.*

USFWS Response: The Applicants have proposed fewer acres of take than was proposed in the past, and lower than Alternative C. If a greater amount of future development occurs as infill, acres of take may be lower than projected.

Public Comments #82 and #70: *The MSCP should incorporate clear biological goals for the covered species.*

USFWS Response: Range-wide biological goals were established early in the development of the SDCP and these goals played a key role in the development of the CLS. USFWS policy indicates that biological goals and objectives must be developed for any HCP being proposed, but are not necessary for each individual species. For the MSCP, biological (target) goals for each Covered Species are not needed beyond those related to take and mitigation in the context of using habitat impacts as a surrogate for take of the Covered Species. In the development of the monitoring plan, Pima County will develop monitoring objectives that will seek to detect defined levels of change with known levels of certainty. With regard to management actions, as the permit is implemented, a number of planning processes will take form, including the reestablishment of the STAT and further refinement of the monitoring and management plans, as well as planning processes such as for the aquatic and riparian management plan.

Public Comments #13, #17, #60, and #63: *The conservation land system as detailed in the 2001 report “Priority Vulnerable Species” is based on poor science and should not be used in the determination of the issuance of a Section 10 Permit.*

USFWS Response: The 2001 report by a contractor to Pima County cited a widely incorrect figure relating to the number of acres necessary to ensure the population viability of lesser long-nosed bats. The report in question was a background information report. This report was not cited in the Public Draft of the MSCP and contains no actionable items relating the implementation of the MSCP. Instead, Appendix A of the MSCP summarizes relevant information pertaining to the Covered Species.

Public Comment #84: *How will the adverse impacts offset by the Riparian and Aquatic Species Management Plan be determined and how will mitigation credits be assigned and used towards species enhancements under the plan?*

USFWS Response: The aquatic and riparian species management plan will be yet another layer of conservation for the species addressed by it. The plan will seek to leverage and highlight additional conservation measures and partnerships that can aid conservation of these species. USFWS will work with Pima County to determine mitigation credits on a case-by-case basis for any actions included in the plan beyond those related to riparian and aquatic habitat conservation as part of the CLS.

Public Comments #23 and #85: *Concerns related to U.S. Army Corps of Engineers 404 permits, In Lieu Fee Mitigation Lands, and Conservation Effluent Pool.*

USFWS Response: Additional detail related to the relationship of the In Lieu Fee land activities and In Lieu Fee conservation easements have been added to the MSCP. A

copy of the In Lieu Fee Conservation Easement will be included in the final MSCP. The U.S. Army Corps of Engineers 404 permitting process and use of In Lieu Fee lands would remain separate from the MSCP and ESA compliance process, except that aspects of each program could be implemented concurrently on the same parcel of land. The use of Conservation Effluent Pool water is discussed in Section 5.1.3.1 of the MSCP. The MSCP has been amended (water rights section) to include commitments of Conservation Effluent Pool water.

Public Comment #45: *Pima County has created no baseline environmental condition to support the automatic 25- percent mitigation credit for County-leased State Trust Land Leases. The MSCP should describe minimum conditions for land quality for any level of mitigation credit to ensure quality habitat for imperiled species. The MSCP has no mechanism for downgrading the conservation credit of ranch lands.*

USFWS Response: The 25 percent credit is based on the stewardship that Pima County provides above that provided by the State Trust. This includes the application of the County rangeland program standards and guidelines and implementation of management plans that are MSCP commitments intended to maintain and improve the condition of the lands. The USFWS does not agree that low-quality habitat is being traded to offset degradation of high-quality areas. Many of the areas to be developed and mitigated are fragmented and unoccupied by the Covered Species. Pima County documented populations of Covered Species in ranch lands both via initial inventories prior to acquisition and since. Ranch lands include many Covered Species PCAs.

It is understood that if areas can be upgraded with regard to the mitigation credits allocated, they can also be downgraded on similar criteria. Just as with upgrading, a determination must be made as to the relative condition of mitigation lands in relation to lands outside of the mitigation lands being evaluated. This is needed so that the condition of these lands can be tied to Pima County actions and not pervasive effects from factors such as drought, wildfire, and other natural processes. The STAT-like science body that may be convened to take on this task will consider these and other factors. Pima County has assured that the science body will have a transparent process. A reference to a downgrading process that would be initiated by USFWS based on information provided in annual reports related to the condition and trends on State Trust lands has been added to the MSCP. Criteria will be established with input from a ranch stewardship group.

Public Comment #47: *The MSCP should be amended to require that the replacement lands for the loss of State Trust Lease lands should be evaluated to be of comparable or equivalent ecological health.*

USFWS Response: Loss of State Trust lands will be offset with either fee-owned or leased lands within the CLS. Other considerations such as where Pima County stands with species mitigation acres and management plans may also affect the selection of

replacement lands. The CLS mitigation value is the common currency used for all mitigation lands, which is related to the overall configuration of the landscape that the MSCP is attempting to achieve along with the broader SDCP. The base value for State Trust lands is less than 100 percent, reflecting their lack of long-term protection and past management. Granting Pima County 25 percent credit for these leases acknowledges the improvement in management under Pima County's standards and guidelines, and their objective of improving habitat conditions on these leased lands. The ecological condition of lands, as well as Pima County's commitment to management and monitoring, will be considered for any lands where Pima County is seeking greater than 25 percent CLS credit.

Public Comments #48, #70, #75, and #100: *The MSCP should include dialogue about the changes in the state of knowledge and changed circumstances as new science becomes available.*

USFWS Response: The MSCP provides such mechanisms already. Preserve management, stocking rates, and ranch management plans will take into account changes in the state of knowledge. There is also a process in place to determine range trends and the location of PCAs using the best science available.

Public Comment #49 and #51: *There are no requirements to implement grazing exclosures to measure the changes on the CLS ranch lands. Pima County's non-specific grazing monitoring program relies on expert opinion and rapid, broad-scale technological methods for assessing cover changes. However, there are no clear proposals to set aside lands with which to compare the vegetation changes that could lead to increased conservation credits. And objective, scientific analysis should underpin any adjustments in the acreage-based credit system.*

USFWS Response: Grazing exclosures are an option to the County under the MSCP as proposed, and implementing an exclosure model might aid the County in its periodic assessment of conditions. Pima County will be looking at a variety of means to measure change over time. If this measure is recommended by an external group that would be identifying the conditions under which credits for State Trust lands are increased, Pima County would strongly consider adding exclosures to other methods of measuring change over time.

Public Comment #57: *There should be public participation in the development of the Coordinated Resource Management Planning process and in setting ecological goals and monitoring frameworks for ranches which have not yet completed this process.*

USFWS Response: Pima County is not a formal signatory on the CRMP Memorandum of Understanding in Arizona. There is nothing in the Memorandum that prohibits public participation, and such involvement is generally set by the lead agency doing a particular CRMP. Pima County has included a requirement in the MSCP that Pima County will

make draft review documents produced by CRMP process, or other ranch management planning, for County-managed ranches available for review and comments by stakeholders (see Section 5.2 of the MSCP).

Public Comment #96: *The County should clarify how disputes over ranchland management policies will be resolved.*

USFWS Response: The County is the fee title owner or primary grazing lease holder of mitigation lands and is solely responsible for land management under the terms of the MSCP. Agreements with the operators on the ranches are a separate contractual process and will come and go with time. Challenges to ranch operations within the context of the MSCP will be the responsibility of the County to address and resolve with assistance from the USFWS.

Public Comments #98, #99, and #101: *Efforts should be made to strengthen the cooperation between NRCS and the County in managing ranchlands. The SDCP Ranch Conservation Technical Advisory Team Form should be used as the basis for creating a Pima County ranch management advisory or review board. The MSCP should include a plan for the creation of such a group.*

USFWS Response: Pima County is in the process of hiring a range program manager. The ideal candidate will have experience with the principles and practices that are employed by the NRCS. Pima County will continue to work with NRCS and seek funding from and with that agency. Pima County will also take advantage of the newly established NRCS and AZGFD cooperative position to establish more cooperative activities and greater communication. Careful consideration will be given to establishing some advisory level panel of technical experts to review and offer recommendations on the overall rangeland management program. However, such a group would be more appropriate under the SDCP and the County rangeland program implementation process.

Public Comment #114: *The MSCP's specific exclusion of actions reviewed under Section 7 of the ESA in the planning area allows for questions and problems which will only complicate the permitting process.*

USFWS Response: The MSCP was amended to remove the Section 7 language.

Public Comment #117: *The MSCP should specifically express that the permit issued by the FWS covers take caused by indirect effects of Covered Activities.*

USFWS Response: Within the MSCP, indirect effects are discussed in Section 3.8, and mitigation for indirect effects is discussed in 4.2.1. The intent of the MSCP is to cover all effects of Covered Activities, including indirect effects. This intent has been clarified in the MSCP.

Public Comments #119 and #120: *The MSCP should specify the number of take for individual species permitted or follow congressional recommendations on ensuring an authorized level of take.*

USFWS Response: Pima County's MSCP includes 44 species and a Permit Area of over 1 million acres. From the perspective of the status of the Covered Species, the STAT worked assiduously to engage those with knowledge about the distribution of species populations and model habitat of Covered Species and worked with species experts to define a suite of PCAs, upon which (for all but two species) the take and mitigation acres are based. PCAs are based on the best available information at the time and they encompass a suite of lands that may not currently be occupied, but which may represent future habitat or habitat that is used during migration. In addition, for some species, a lot of new survey effort was devoted to establishing the locations of populations and distribution of Covered Species in the Planning Area, not only through the Pima County MSCP but also via later habitat conservation planning grants to the City of Tucson and Town of Marana. None of this work, however, provides a firm baseline for the number of species, and even if such numbers were available, those estimates would have to be continuously updated to track population fluctuations over time. On a program of the scale of Pima County's MSCP, such an endeavor would not be an efficient use of resources. The use of habitat as a proxy for species has a long history in wildlife biology. The USFWS determined that habitat could be used as a surrogate for the Pima County MSCP, as most large-scale HCPs have done.

It is further instructive to understand the scale of information that the USFWS uses to determine the impact that the Pima County MSCP (or any HCP) has on a species. For a very few species (e.g., whooping crane) the number of individuals that exist can be enumerated, and an HCP evaluation—through the Biological Opinion process—can evaluate the number of individuals harmed or even the likelihood of metabolic impact to individuals. The next level of analysis would be for a species with a known or estimated number of populations. For the Pima County MSCP, these species include the Chiricahua leopard frog, Gila chub, and Gila topminnow. For these species, the USFWS may be able to estimate take, except for the fact that the Covered Activities are not anticipated to cause take of any known populations of these species. Instead, Pima County is proposing to cover these species because of the possibility that they will expand their range into the areas of the PCAs that are not currently occupied. How to best estimate take of individuals on unoccupied (even currently non-habitat) lands is fraught with uncertainty. Finally, large groups of species exist that have much broader distributions, but for which there are no range-wide population estimates. Instead, the best available information is often a few site-specific abundance or demographic data points from past studies, as well as larger collections of point data related to random or targeted sightings of the species. From this information, distribution maps can be built and habitat can be modeled across broad landscapes. Pima County focused on habitat modeling and expert identification of PCAs due to these issues. Given the size of the

Permit Area (>1,000,000 acres), the habitat currency was determined to be the most appropriate metric for estimating take.

On a more practical, programmatic level, counting individuals that are harmed, harassed, injured, or killed as a result of Covered Activities by requiring project-clearance surveys for all Covered Species would not address the fundamental lack of knowledge regarding the total number of individuals present at baseline, because such surveys would be occurring in a small part of the Permit Area potentially occupied by the species. The scientific input received from the STAT indicated that the efficacy of such an approach would be lower than the habitat approach. The individual species approach would also increase the time and effort expended by the regulated community. However, because of the proposed Opt-in and Opt-out Provision options, a developer that does not want to utilize the County's permit is free to employ the method of their choice to address their liability under Section 9 of the ESA. An explanation of the habitat acre currency employed for take and mitigation calculations is found within the Final MSCP, and a discussion relating habitat impacts to take of individuals is included in each species account found in Appendix A of the MSCP.

Public Comment #90: *The MSCP should clearly define its involvement concerning any potential critical habitat designations which could arise in the future. If the county plans to be exempt from having to comply with any adverse modification prohibitions or other requirements under section 7 of the ESA, does Pima County believe that the conservation measures in the MSCP exceed those required under a section 7 consultation triggered by critical habitat?*

USFWS Response: The USFWS will consider the effects to currently designated critical habitat in the 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 (as described in the Final MSCP, Section 7.2 and Table 7.1). In these cases, no further action by Pima County is needed beyond those actions already described under changed circumstances because of the "No Surprises" policy. However, the USFWS would evaluate the need to re-initiate consultation based on effects of the implementation of the MSCP on these 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 primary constituent elements of the species' habitat in the areas included in these future critical habitat designations. If the effects on critical habitat were considered in the existing Biological Opinion, reinitiation of the consultation may not be needed. If USFWS had not considered the effects in the Biological Opinion, then the USFWS may 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, the Final MSCP (Section 7.2) describes the options available to Pima County.

Public Comment #127: *Periodic “ground truthing” should be performed to validate the biological and environmental integrity of the CLS land categories as they were shaped by GIS mapping.*

USFWS Response: The STAT adopted a policy in 2009 for revision of the CLS, which states:

it would be incorrect to base revision of the CLS upon new habitat suitability models alone. The STAT re-iterates its recommendation that any revision of the CLS be based upon a similarly comprehensive review of available biological data, including fine-filter and coarse-filter information as well as review of the principles of reserve design by a similarly constituted advisory body.

Public Comment #170: *The County's proposal to use a passive survey method in Buehman canyon could result in false negative results if searches are conducted on days when conditions are not optimal for longfin dace observation. Coordination between the County, USFWS, and the Department's Nongame Branch should be conducted to develop a long-term monitoring plan for all monitored fish species.*

USFWS Response: The habitat in Buehman Canyon is very conducive to passive surveys, in part because longfin dace are often restricted to just a few (pool) locations. Netting in these locations can be unnecessary and could harm the species. The County is committed to using the best methods to gather the best information on the Covered Species. The County will use an iterative process to improve monitoring methods and survey protocols based on monitoring results and conditions in the areas being monitored.

Covered Activities/Permitting Issues

Public Comments #104, #105 and #193: *The MSCP only covering development activities requiring 14,000 square feet of grading or more encourages excessive grading and penalizes those wishing to grade a smaller area. The plan should provide permit coverage for all landowners since all these landowners contributed to acquiring mitigation land through their property taxes.*

USFWS Response: During the development of the MSCP, Pima County considered what type of grading permit and what amount of grading would be used to set the minimum threshold for coverage provided on single-dwelling residential lots. Although the County does issue permits for grading less than 14,000 square feet, the potential for take where grading falls below 14,000 square feet is considered to be *de minimus* and

was deemed inappropriate as a Covered Activity. Additionally, the County assessed the administrative challenges of providing coverage for these *de minimus* impacts and determined that overcoming the administrative challenges was not feasible. The County also considered limiting coverage on single-dwelling residential lots to only those acres specified in the grading permit, but found that the administrative challenges of doing so were similarly infeasible. The MSCP has been modified to clarify that impacts from private development on single-dwelling residential lots, residential subdivisions, and non-residential developments can receive coverage provided that the property owner elects to receive coverage and when all conditions established in the MSCP are met. With respect to coverage for single-dwelling residential lots, the requirement for a permit to grade 14,000 square feet or more establishes eligibility for coverage. However, regardless of the amount of grading to be done, the County is to provide 100 percent mitigation for the entire parcel. Under this approach the entire property will be considered disturbed regardless of the amount of grading authorized by the permit, and incidental take for the entire property would be mitigated.

Public Comment #106: *The MSCP does not clearly state whether projects outside the CLS will be permitted to opt-in. Also, criteria set forth in the MSCP for opting-in are unrealistic for typical real estate transactions.*

USFWS Response: The MSCP has been modified to clarify the following: that impacts from private development on single-dwelling residential lots, residential subdivisions, and non-residential developments can receive coverage regardless of whether impacts occur inside or outside of the CLS, provided that all conditions established in the MSCP are met; that impacts from the development of a project on private property are eligible for permit coverage regardless of whether the County approved that project before or after adoption of the CLS; and that single-dwelling lot owners can receive coverage should they require a permit to grade 14,000 square feet or more provided that their lot has not previously received coverage via the Opt-In Program. Other points raised here have been considered in the crafting of the MSCP and weighed against input received pursuant to multiple conversations with industry groups stakeholder, Pima County Development Services Department, and the USFWS.

Land/Mitigation/Monitoring

Public Comment #110: *The MSCP impact and mitigation calculations are inconsistent and vague; detailed explanations of acreage calculations are needed.*

USFWS Response: The acreage of total impacts was derived from the land absorption model, based on projections of urban growth as described in Appendix G of the MSCP. Acreage of coverage in Alternative D considered likely land absorption, balanced by the availability of mitigation lands Pima County has already acquired, funding, and uncertainty associated with who may opt in or out of coverage. Within the EIS,

Alternative C evaluates impacts from a permit that covers all County activities and assumes that all private development activities are covered and mitigated.

Public Comments #111, #157, #177, #178, and #179: *The MSCP does not provide rationale for mitigation ratios and credits used.*

USFWS Response: USFWS has been working with Pima County to determine how the mitigation credits are applied. The USFWS will not allow the County 100 percent mitigation of land that does not fulfill all four layers of the "mitigation sandwich," which are: ownership, legal protection, monitoring, and management.

Within the EIS, alternatives use a range of mitigation ratios. The Preferred Alternative uses the highest ratios and provides more mitigation land than does Alternative B, which uses a similarly high ratio, but covers less land. Species mitigation ratios exceeding 1:1 support a finding that Pima County is mitigating to the maximum extent practicable and help support the biological reserve design embodied in the CLS. Appendix B has been added to clarify how CLS mitigation obligations and credits will be determined.

Public Comment #115: *The MSCP should provide incidental take coverage for monitoring and management to all private landowners.*

USFWS Response: It was determined that the risk of take for such actions is *de minimus* and actions the property owner(s) employ to maintain the undeveloped, natural open space condition of set-aside lands are not considered a Pima County undertaking and, with rare exception, are not subject to their permitting authority.

Public Comments #116 and #156: *The MSCP should more clearly define the types of activities covered under the permit.*

USFWS Response: USFWS and Pima County considered the types of Covered Activities in the development of the MSCP. Covered Activities are adequately defined in Section 3.4 of the MSCP.

Public Comment #118: *The MSCP should provide water coverage for the entire community, including privately operated water and sewer utility companies, not just for County water activities.*

USFWS Response: The extent of proposed coverage is chosen by the applicant and evaluated by the USFWS. The USFWS can restrict the coverage, but cannot force an applicant to expand coverage. Alternative C provides coverage for all activities permitted by Pima County, but Pima County does not have authority over the Arizona Pollutant Discharge Elimination System program. Pima County cannot cover impacts for activities not under their jurisdiction. Pima County could cover water quality impacts of septic systems, but there is very little likelihood of incidental take from these activities; therefore, this activity was not covered under the Preferred Alternative (Alternative D).

The direct impacts associated with grading for the septic system would be the more likely cause of incidental take, and grading is a covered activity. Pima County would include any effluent discharges from County wastewater treatment facilities (to which the industrial discharges flow) as Covered Activities under Alternatives C and D.

Public Comment #76 (Bullet 1): *Pima County should conduct detailed biological and Special Element surveys on all acquired fee simple lands to establish a reliable ecological baseline.*

USFWS Response: A discussion of inventory efforts that would be undertaken at a select suite of mitigation lands is found in Appendix Q of the MSCP. These inventories are currently being field tested and include springs inventory, identification of talus slopes, and inventory of water sources. It is also important to recognize that Pima County is entering into the permit with a suite of mitigation lands that is currently almost enough to mitigate for the entire permit period (under Alternative D). Under most HCPs, mitigation lands are acquired after permit issuance. Pima County efforts to begin collecting data on the current suite of mitigation lands shows the County's commitment to the inventory and monitoring efforts.

Public Comment #76 (Bullet 2): *To the maximum extent practicable, Pima County should "bank ahead," via legal instruments that ensure conservation in perpetuity, with like-for-like habitat as close to the area of impact as is possible.*

USFWS Response: Conservation Easements on Pima County's Fee-Simple Lands are described in Section 4.5.1.2 of the MSCP. Conservation Easements or other approved legal instruments will be placed ahead of impacts.

Public Comment #76 (Bullet 3): *Impacts to Special Elements should be incorporated into the annual reporting to the FWS.*

USFWS Response: Special elements are an important part of the SDCP conservation approach, but they are not a part of the MSCP. However, Pima County could periodically report on the impacts to most Special Elements for which data are available.

Public Comment #76 (Bullet 4): *The County should develop Conservation and Management Goals for each Special Element and these should be discussed in the MSCP in the Impacts, Mitigation, Covered Species, and Monitoring and Adaptive Management sections.*

USFWS Response: Pima County similarly has developed a broad perspective in monitoring by focusing on habitat elements for Covered Species. However, setting goals for elements that are not part of the MSCP is not warranted, unless those elements are directly related to the Covered Species.

Public Comment #76 (Bullet 5): *Any future bond monies approved by voters should be used to acquire lands that support populations of covered species, high quality suitable habitat and/or Special Elements critical to the future survival of covered species.*

USFWS Response: Pima County proposes bond measures for a variety of public purposes, including species and their habitats. The permit would not restrict Pima County's use of bond money; however, Pima County has stipulated in the MSCP when acquired lands will be eligible. As proposed, acquisitions of lands in the CLS would be eligible as mitigation lands (see Section 4.5 of MSCP). In addition, land outside the CLS might also qualify (see Section 4.3.1 of MSCP).

Public Comment #77: *All conservation easements or other legal instruments should specify that the land in question is being set aside in perpetuity and that the County and RFCD have the unquestionable right to enforce the terms of restrictions.*

USFWS Response: Please see Appendix J of the MSCP, "Restrictive covenant template for Mitigation Land Owned in Fee Simple by Pima County or Pima County Regional Flood Control District," which includes provisions for enforcement and perpetuity.

Public Comment #79: *The MSCP should clearly develop and define ranchland management plans, and complementary resource management plans on ranch, preserve, and set aside lands the County intends to use for mitigation credit.*

USFWS Response: The functions and differences between ranch management agreements and CRMPs have been better defined in the Final MSCP. CRMPs, or CRMP-like plans that may be developed, will incorporate management objectives and be structured to follow the Memorandum of Understanding establishing their use in Arizona. The County will develop a management plan for large mitigation lands, as necessary, that will cover a variety of natural resource issues. In general, there are no inherent conflicts between the ranch management program and the MSCP. Pima County is proposing a monitoring program that, along with range monitoring, would detect changes to determine if some key resources are being impacted. Right-of-entry access to set-aside lands was considered by the County as part of the MSCP. Regarding public commenting, please see response to Comment #57.

Public Comment #81: *The MSCP should clearly state that habitat being used to mitigate for impacts to a specific species can only be counted as mitigation if the species actually occurs there or has the potential to use that habitat for migration, dispersal, or as occupied habitat territory. The County should incorporate the species enhancement measures listed in Appendix A.*

USFWS Response: This suggestion has been discussed by USFWS and Pima County; however, for the majority of the Covered Species, the size and scope of the PCAs would

be revised downward and some species may be dropped from the permit altogether. It was determined that including lands in the PCAs that have the potential for future occupancy was more appropriate, both from a conservation perspective and a regulatory assurances perspective.

The County has shown a commitment to the conservation of a large land base, and funds have been identified for monitoring and reporting. Pima County leadership has stated that they understand that monitoring is an integral part of obtaining a permit and funding the program would be a condition of the permit.

Public Comments #88, #172 and #173: *The County should provide more information on the monitoring program planned, including the amount of monitors carrying out this work and a general monitoring schedule. It is unclear why some monitoring protocols are undetermined, and why for some species there will be a delay before protocols will be developed and monitoring will begin.*

USFWS Response: Based on USFWS guidance, Pima County will develop a monitoring calendar after permit issuance. The County will adhere to the MSCP as far as frequency of surveys. The monitoring program and protocols will be developed with USFWS guidance. This is an iterative process that may take multiple seasons of monitoring to ultimately inform what protocol best meets the needs of the permit requirements and monitoring objectives. For species where there are undetermined protocols or protocols that may have some delay before being finalized, this does not mean no survey or monitoring will occur in the interim. Rather, it means the initial work will inform the development of the ultimate protocol that will be used for permit purposes. Timing of monitoring surveys will depend on when the permit is issued (fall permit issuance would result in delays of monitoring for species active in the spring/summer).

Public Comment #171: *The County and USFWS should coordinate with the Department's Nongame Branch concerning monitoring protocols for the Chiricahua leopard frog.*

USFWS Response: The County has committed to continue to work with a host of partners to achieve conservation efforts. For example, the County recently approached the AZGFD for their assistance with Chiricahua leopard frog reintroductions at the Sands and Clyne ranches. The County will use the USFWS/AZGFD Chiricahua leopard frog monitoring protocol, as indicated in the MSCP document.

Editorial/Clarification

Public Comments #5, #70, #72, #73, #78, #83, #81, #166, #167, #169: These comments requested clarifications, edits, or other related revisions to the MSCP.

USFWS Response: The majority of information needed for clarifications requested is found in Appendix A of the MSCP. The MSCP has been reviewed and revised for consistency. Tables were revised based on updated information and revisions based on public comments.

The procedure for modification of regulations in Table 4.1 is clearly stated in Section 4.2.

MSCP project costs and funding of programs were disclosed in Chapter 8.

Additional details or modifications of the MSCP requested by commenters were made based on USFWS guidance; however, some requests for details or descriptions were not required.

Public Comment #50: *There is a significant discrepancy between the utilization levels reported throughout the MSCP, these should be corrected in the final draft.*

USFWS Response: Utilization levels are based on any given grazing period, not averaging across years. This has been clarified in the MSCP.

Public Comment #91: *The MSCP's plan for "incidental taking" of covered species is an insult to our environment and people which violates the Endangered Species Act. Additionally, "incidental" should be removed as it implies these species just happen to be in the way of the County's proposed plan.*

USFWS Response: Under the ESA, habitat conservation planning is an alternative to project-specific compliance that offers certain advantages to species. "Incidental" as used in the term "incidental take" under the ESA has a specific meaning, which differs somewhat from the traditional meaning. As a term under the ESA, incidental take is a criterion under which HCPs are evaluated and is related to the conditions under which take of Covered Species occurs. Classifying the take as incidental does not reduce the obligation under the MSCP to address and mitigate take of Covered Species.

6.4 Administration of the MSCP

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 Covered 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 MSCP Implementing Agreement (Pima County MSCP Appendix D).

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

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

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

The STAT was instrumental in the development of the SDCP and MSCP. A new group of STAT members will be assembled within 12 months of permit issuance for the development and implementation of the Pima County Effectiveness Monitoring Plan. The new STAT group will work on the following:

- 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;
- 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.

6.5 Distribution List

Notification of the availability of the Final EIS will be sent to the entities listed in Section 6.2. Additionally, notice will be sent to the offices of:

- Honorable Raúl Grijalva, U.S. Representative, Arizona, 3rd District
738 N. 5th Ave. Suite 110, Tucson, Arizona 85705
- Honorable Ed Pastor, U.S. Representative, Arizona, 7th District, 411 North Central Avenue, Suite 150, Phoenix, AZ 85004
- Honorable Ron Barber, U.S. Representative, Arizona, 2nd District, 3945 E. Fort Lowell Road, Suite 211, Tucson, AZ 85712
- Honorable Trent Franks, U.S. Representative, Arizona 8th District, 7121 West Bell Road, Suite 200, Glendale, AZ 85308
- Honorable John McCain, U.S. Senator, Arizona
407 West Congress Street, Suite 103, Tucson, Arizona 85701
- Honorable Jeff Flake, U.S. Senator, Arizona
6840 North Oracle Rd., Suite 150, Tucson, Arizona 85704
- Honorable Jan Brewer, Governor of Arizona
1700 West Washington, Phoenix, Arizona 85007
- Arizona State Senators
400 West Congress Street, #201, Tucson, Arizona 85701
 - Senator Al Melvin (District 11)
 - Senator Ed Ableser (District 26)
 - Senator Olivia Cajero Bedford (District 3)
 - Senator Leah Landrum Taylor (District 27)
 - Senator Adam Driggs (District 28)
 - Senator Steve Gallardo (District 29)
 - Senator Robert Meza (District 30)
- Arizona State Representatives
400 West Congress Street, #201, Tucson, Arizona 85701
 - Representatives Andrew Sherwood and Juan Mendez (District 26)

- Representatives Norma A. Muñoz and Catherine H. Miranda(District 27)
- Representatives Kate Brophy McGee and Eric Meyer (District 28)
- Representatives Martín J. Quezada and Lydia Hernández (District 29)
- Representatives Jonathan Larkin and Debbie McCune Davis (District 30)
- Henry Darwin, Director of the Arizona Department of Environmental Quality
1110 West Washington Street, Phoenix, AZ 85007
- Pima County Public Library, Joel D. Valdez Main Library
101 North Stone Avenue, Tucson, AZ 85701
- Pima County Public Library, Miller-Golf Links Branch Library
9640 E. Golf Links Road, Tucson, AZ 85730
- Pima County Public Library, Caviglia-Arivaca Branch Library
P.O. Box 668, Arivaca, AZ 85601
- Pima County Public Library, Sahuarita Branch Library
725 W. Via Rancho Sahuarita, Sahuarita, AZ 85629
- Pima County Public Library, Salazar-Ajo Branch Library
15 W. Plaza st. #179, Ajo, AZ 85321
- Pima County Public Library, Geasa-Marana Branch Library
13370 N. Lon Adams Road, Marana, AZ 85653

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7.0 List of Preparers: Document Preparation Team

This EIS was prepared by RECON, a multidisciplinary environmental consulting firm. Founded in 1972, RECON has 40 years of experience providing NEPA services and facilitating compliance with the ESA and other Federal, State, and local regulations for clients throughout the western United States. The following RECON professionals participated in the preparation of this document, as well as the Pima County MSCP (Table 7.1).

**TABLE 7.1
LIST OF PREPARERS**

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Stacey Higgins	Production

The USFWS personnel in the Tucson Field Office were instrumental in guiding the EIS preparation. Numerous other people contributed to this EIS and the Pima County MSCP both directly and indirectly, by information they provided, documents they authored that were used as references, their careful review and consideration of the document contents and concepts, and suggestions for improving accuracy and thoroughness. This large, broad-based group includes interested citizens, scientists, government agency representatives, committee members, private firms, development industry associations, environmental organizations, and nationally recognized experts in habitat conservation and endangered species. Much information was drawn from prior documents prepared in support of Pima County's SDCP.

Council of Environmental Quality Implementing Regulations for NEPA require that a third party preparing an EIS for a Federal agency shall execute a disclosure statement specifying that there would be no financial or other special interest in the outcome of the project. RECON has assisted with the development of the EIS and a copy of their disclosure statement is found in Appendix C of this Final EIS.

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9.0 Glossary of Terms and Acronyms

9.1 Terms

adit. A nearly horizontal passage from the surface associated with a mine. Adits often serve as roosts for certain bat species.

alluvial. Related to, composed of, or found in alluvium.

alluvium. Clay, silt, sand, gravel, or similar detrital material deposited by running water.

aquifer. Water-bearing stratum of permeable rock, sand, or gravel.

archaeology. The scientific study of material remains of past human life and activities.

bajada. Wide, downsloping, alluvial plain.

biodiversity. The variety of life forms and its processes, including the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur.

biology. The study of plant and animal life.

cienea. A permanently or seasonally saturated “seep wetland,” dominated by sedges and other herbaceous and woody wetland plants.

conservation. The use of methods and procedures necessary to bring any endangered or threatened species to the point at which the measures provided under the ESA are no longer necessary; includes research, census, law enforcement, habitat acquisition, and maintenance, propagation, live trapping, and transportation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking.

database. A collection of data organized for rapid search and retrieval.

dendritic. Resembling or having dendrites; branching like a tree.

devegetation. Cutting back vegetative cover.

development. The process of developing a tract of land without structures or infrastructure into land with residences, commercial buildings, and other uses, structures, and supporting infrastructure.

easement. An interest in land owned by another that entitles its holder to a specific limited use or enjoyment; *also*: an area of land covered by an easement.

ecology. The study of the totality of patterns or relations between organisms and their environment.

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

endangered species. An animal or plant species in danger of extinction throughout all or a significant portion of its range.

evapotranspiration. Loss of water from vegetation both by evaporation and by transpiration; primarily affected by temperature, relative humidity and wind.

exceedance. An act or instance of exceeding a limit or amount; typically associated with regulatory thresholds.

feral. Animals having escaped from domestication and become wild.

geographic information system (GIS). A type of software for digital mapping and data analysis on computers.

habitat. The place or environment where a plant or animal naturally lives and grows (a group of particular environmental conditions).

habitat conservation plan. A plan that outlines ways of maintaining, enhancing, and protecting a given habitat type needed to protect species; usually includes measures to minimize or mitigate impacts, and may include provisions for permanently protecting land, restoring habitat, and relocating plants or animals to another area. Required before an incidental take permit may be issued.

incremental. A series of regular, consecutive additions.

incidental take. Take that results from, but is not the purpose of, carrying out an otherwise lawful activity.

infrastructure. The underlying foundation or basic framework of a system or organization.

integrate. To form or blend into a whole; to unite.

interglacial. Occurring or formed between glacial epochs.

inventory. An itemized list of current assets.

invertebrate. An animal lacking a spinal column.

listed species. A species, subspecies, or distinct vertebrate population segment that has been added to the Federal list of endangered and threatened wildlife and plants.

logistics. The handling of the details of an operation.

methodology. A particular procedure or set of procedures.

mitigate. To cause to become less harsh or hostile; to make less severe or painful.

monitor. To watch, observe, or check. Especially for a special purpose.

non-native. Refers to plant or wildlife species outside of their historic range that are introduced to one ecosystem from another ecosystem in which they occur naturally and are indigenous. Some non-native species are invasive and effectively displace native species. Their invasion threatens native ecosystems or commercial, agricultural, or recreational activities dependent on these ecosystems.

objective. Something toward which effort is directed.

perennial. Present at all seasons of the year.

perpetual. Eternal.

priority vulnerable species. In Pima County, these are the plant and wildlife species that are being considered and analyzed as potentially Covered Species under the multi-species conservation plan. These species were chosen through a process of scientific review of numerous species that are currently listed as threatened or endangered or recognized by the Federal government as candidates for listing, and a much larger number of species that are in decline.

proactive. Acting in anticipation of future problems, needs, or changes.

quantify. To determine, express, or measure the quantity of.

recreationist. A person who seeks recreation, especially in the outdoors.

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.

rockhounding. Rock and mineral collecting, typically by amateurs.

species. For the purposes of the ESA, this term includes any species or subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature.

take. 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.

thermal. Of, relating to, or marked by the presence of hot springs.

threatened species. An animal or plant species likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

topography. The configuration of a surface including its relief and the position of its natural and man-made features.

viability. Capable of existence and development as an independent unit.

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

wildland. A non-urbanized, non-developed area with vegetative cover, where fire management priorities are more focused on natural resource management rather than on protection of life and property, as they are in developed areas. Wildland/urban interface describes the area or zone where structures and other human development meet and intermingle with the undeveloped natural ecosystems or combustible vegetative fuels, and where a safe and balanced approach must be taken.

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

xeriscape. A landscaping method that uses water-conserving landscape, planting, and irrigation techniques.

9.2 Acronyms

ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
ADWR	Arizona Department of Water Resources
AMA	Active Management Area
ARS	Arizona Revised Statutes
ASLD	Arizona State Land Department
AUM	Animal Unit Month
AZGFD	Arizona Game and Fish Department
BLM	Bureau of Land Management
BOS	Board of Supervisors
CAA	Clean Air Act of 1970
CAP	Central Arizona Project
CFR	Code of Federal Regulations
CH ₄	methane
CLS	Maeveen Marie Behan Conservation Lands System
CO	carbon monoxide
CO ₂	carbon dioxide
CRMP	Coordinated Resource Management Plan
DMAFB	Davis–Monthan Air Force Base
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
° F	degrees Fahrenheit
FR	Federal Register
GHG	greenhouse gas
GIS	geographic information system
HCP	habitat conservation plan
kV	kilovolt
MSCP	Multi-species Conservation Plan
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO ₂	nitrogen dioxide

N ₂ O	nitrous oxide
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRPR	Natural Resources Parks & Recreation Department
O ₃	ozone
PAG	Pima Association of Governments
PCA	priority conservation area
PDEQ	Pima County Department of Environmental Quality
PM	particulate matter (PM _{2.5} and PM ₁₀)
PM _{2.5}	particulate matter less than 2.5 microns in size
PM ₁₀	particulate matter less than 10 microns in size
PVS	Priority Vulnerable Species
RECON	RECON Environmental, Inc.
RFCD	Pima County Regional Flood Control District
RPPA	Recreation and Public Purposes Act
SDCP	Sonoran Desert Conservation Plan
SIP	State Implementation Plan
SO ₂	sulfur dioxide
SRHP	State Register of Historic Places
STAT	Science Technical Advisory Team
TEP	Tucson Electric Power Company
USDA	United State Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
WUS	Waters of the United States