Saguaro National Park
Arizona
National Park Service
U.S. Department of the Interior



Saguaro National Park

Draft
General Management Plan / Environmental Impact Statement

Draft
General Management Plan / Environmental Impact Statement
Saguaro National Park
Pima County, Arizona

Saguaro National Park was established by President Hoover on March 1, 1933. Originally named Saguaro National Monument, the name was changed to Saguaro National Park by an act of Congress on October 14, 1994. The last general management plan for the park was completed in 1988. Much has changed since 1988 — visitor use patterns and types have changed, the population of the city of Tucson has doubled, and an additional 7,577 acres have been added to the park. Each of these changes has implications for how visitors access and use the national park and the facilities needed to support those uses, how resources are managed, and how the National Park Service manages its operations. A new plan is needed.

This document examines three alternatives for managing the park for the next 25 years. It also analyzes the impacts of implementing each of the alternatives. The **"no-action" alternative, alternative 1,** consists of continuing the existing park management and trends and serves as a basis for comparison in evaluating the other alternatives. The concept for park management under **alternative 2** would be to protect the park's ecological processes and biological diversity by reducing fragmentation of wildlife and plant habitats and protecting wildlife corridors. The concept for park management under **alternative 3** would be to provide a wider range of opportunities for visitors that would be compatible with the preservation of park resources and wilderness characteristics. Alternative 2 is the National Park Service's preferred alternative.

This *Draft General Management Plan / Environmental Impact Statement* has been distributed to other agencies and interested organizations and individuals for their review and comment. The public comment period for this document will last for 60 days after the Environmental Protection Agency's notice of availability has been published in the *Federal Register*. Readers are encouraged to submit their comments on this draft plan. Please see "How to Comment on this Plan" on the next page. Please note that NPS practice is to make comments, including names and addresses of respondents, available for public review; see "How to Comment on this Plan" discussion on the next page for further information.

HOW TO COMMENT ON THIS PLAN

Comments on this plan are welcome and will be accepted for 60 days after the Environmental Protection Agency's notice of availability appears in the *Federal Register*. Comments/responses to the material may be submitted either over the Internet or in writing. Please comment only once.

Please include your name and address on any correspondence, particularly any e-mail messages to be sure that you are included on our mailing list.

Commenters are encouraged to use the Internet if at all possible.

Internet comments can be submitted at <http://parkplanning.nps.gov/sagu> and then choose the general management plan.

Written comments may be sent to:

Superintendent Sarah Craighead
Saguaro National Park
3693 South Old Spanish Trail
Tucson, AZ 85730-5601

Verbal comments may be made at public meetings. The dates, times, and locations of public meetings will be announced in the media following release of this document.

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment — including your personal identifying information — may be made publicly available at any time. Although you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

SUMMARY

Saguaro National Park was authorized as a national monument by Presidential Proclamation on March 1, 1933. Boundary changes have taken place in 1961, 1976, 1991, and 1994, and in 1994 the national monument was redesignated as a national park. The park includes 91,445.96 acres, with 71,400 of those acres being designated wilderness.

The last comprehensive planning effort (general management plan) for Saguaro National Park was completed in 1988. Much has occurred since 1988 — visitor use patterns and types have changed, the population of the city of Tucson has doubled, and an additional 7,577 acres have been added to the park. Each of these changes has major implications for how visitors access and use the national park and the facilities needed to support those uses, how resources are managed, and how the National Park Service manages its operations. A new plan is needed to

> Clearly define resource conditions and visitor experiences to be achieved in Saguaro National Park.
>
> Provide a framework for NPS managers to use when making decisions about how to best protect national park resources, how to provide a diverse range of visitor experience opportunities, how to manage visitor use, and what kinds of facilities, if any, to develop in the national park.
>
> Ensure that this foundation for decision making has been developed in consultation with interested stakeholders and adopted by the NPS leadership after an adequate analysis of the benefits, impacts, and economic costs of alternative courses of action.

This *Draft General Management Plan / Environmental Impact Statement* presents three alternatives, including the National Park Service's preferred alternative, for future management of Saguaro National Park. The alternatives, which are based on the national park's purpose, significance, and special mandates, present different ways to manage resources and visitor use and improve facilities and infrastructure at the national park. The three alternatives are the no-action alternative (continue current management), alternative 2, the preferred alternative, and alternative 3.

Additional actions were considered in a fourth alternative. However this alternative was dismissed from further analysis. These dismissed actions are presented, along with rationale for dismissing them from analysis, in Chapter 2, "Alternatives, Including the Preferred Alternative."

ALTERNATIVE 1: THE NO-ACTION ALTERNATIVE (CONTINUE CURRENT MANAGEMENT)

The no-action alternative is a continuation of current management and trends. This alternative sets a baseline for comparison with the two action alternatives. Examining the no-action alternative is often helpful in understanding why the National Park Service or the public may believe that certain future changes are necessary or advisable.

The park's enabling legislation and NPS management policies would provide guidance for all of the alternatives, and under alternative 1, guidance from the 1988 *General Management Plan* would continue to guide park management. The park has implemented many of the actions identified in the 1988 *General Management Plan*. The park would continue to be managed as it is today, with no major change in management direction.

There would be major beneficial impacts on the visitor experience from continued opportunities to participate in diverse recreational opportunities that bring visitors in close contact with one of the most interesting and unusual collections of desert life in the United States, including the highly valued opportunities for solitude and getting in touch with nature. However, minor to major adverse impacts on the visitor experience from user conflicts on trails and increasing commuter traffic along through-park roads would continue.

Because the park staff would have difficulty maintaining its high standard of service while keeping pace with local and regional population growth and urban development, economic activity associated with the park in terms of visitor spending, sales, personal income, and jobs would decrease — resulting in long-term moderate adverse effects on the socioeconomic environment.

Continuing the current downward trend in park staffing would likely result in an increasing inability to effectively meet demands on park operations due to steadily increasing visitation. This continued direction would create a long-term moderate adverse effect on park operations.

Continuing to maintain the Rincon Mountain District visitor center and current law enforcement requirements to manage traffic along Picture Rocks Road would create long-term major adverse impacts on park operations. There would be long-term moderate adverse impacts on park operations and facilities from continuing current management practices regarding trails and trailheads and parking areas, maintenance of the Golden Gate Road, the continuation of inadequate office space for park staff, the removal of the corral at Madrona, monitoring the Civilian Aeronautical Administration building, and stabilizing Manning Cabin.

ALTERNATIVE 2 (PREFERRED ALTERNATIVE)

In alternative 2 the emphasis would be on protecting the park's ecological processes and biological diversity by reducing fragmentation of wildlife and plant habitats and protecting wildlife movement corridors. Management efforts would focus on creating connections between isolated wildlife habitats and corridors. Park managers would make choices and take actions that would best achieve ecological/ biological diversity. Visitation would be managed and redirected, when necessary, to protect sensitive resources and minimize impacts on resources. Basic facilities for visitor safety and services would be provided inside the park. Appropriate access would be provided for visitors to enjoy the park and learn about the Sonoran Desert and associated habitat.

Implementing alternative 2 would result in moderate and major beneficial impacts on the visitor experience resulting from enhanced protection of visitor experiences and recreational activities that are unique to the park, including outstanding primitive hiking and camping and opportunities for solitude. The provision of new opportunities such as bicycling and educational programs would be a moderate beneficial impact on the range of recreational opportunities. Further, current adverse impacts from user conflicts on trails, increasing use in wilderness areas that may threaten visitors' opportunities for solitude, and increasing commuter traffic along through-park roads would be moderated, resulting in moderate to major beneficial impacts.

Increased visitation would benefit the local community through increasing spending related to recreational activity and possibly extended stays. Alternative 2 would result in an overall moderate long-term beneficial effect on the socioeconomic environment.

The additional positions required to address protection of biodiversity and resource protection while accommodating increased use would be expected to create long-term moderate beneficial effects on park operations. There would be long-term major beneficial impacts on park operations and facilities from improvements to trails and trailheads, the conversion of Golden Gate Road to a trail, expansion of the Rincon Mountain District visitor center, construction of traffic-calming devices along Picture Rocks Road, and development of adequate office space for park staff.

Actions that would create long-term moderate beneficial effects on park operations and facilities include the removal and relocation of the Civilian Aeronautical Administration building, the removal and reconstruction of the corral and park housing at Madrona, the reduction of equipment and personnel at Manning Camp, and the new exhibits and other interpretive media installed in the Rincon Mountain visitor center and at key locations around the park.

ALTERNATIVE 3

In alternative 3 the emphasis would be on providing a wider range of opportunities for visitors that is compatible with the preservation of park resources and its wilderness characteristics. Natural resources would be protected by relocating visitor activities now occurring in sensitive areas to areas that could withstand higher levels of visitation. Management efforts would focus on developing additional opportunities for visitors to enjoy and learn about the park. Visitors would have a variety of activities available in easily reached areas of the park. Primitive visitor experiences would be available in areas that are harder to reach. Facilities would be expanded to provide additional support for visitor activities.

There would be moderate beneficial impacts on visitor experiences resulting from more opportunities to participate in diverse recreational opportunities that bring visitors in close contact with unusual and interesting desert life. Further, current adverse impacts from user conflicts on trails, increasing use in wilderness areas that may threaten visitors' opportunities for solitude, and increasing commuting traffic along through-park roads would be moderated and result in long-term moderate to major beneficial impacts.

Increased visitation would benefit the local community through increased spending related to recreational activity, which would likely result in more extended stays than in alternative 2. Alternative 3 would result in an overall moderate long-term beneficial effect on the socioeconomic environment.

The additional positions required to address expanded programs and opportunities for park visitors would be expected to create long-term moderate beneficial effects on park operations by accommodating increased use.

Actions that would create long-term moderate adverse effects on park operations would be the required ongoing maintenance of the Golden Gate Road, new trails, and possible new campsites.

Actions that would create long-term major beneficial impacts on park operations and facilities would include improvements to trails and trailheads, expansion of the Rincon Mountain District visitor center, construction of traffic-calming devices along Picture Rocks Road, development of adequate office space for park staff, and construction of a visitor contact station and science station at Madrona and rehabilitation of existing facilities for learning and education centers.

Actions that would create long-term moderate beneficial effects on park operations and facilities include the relocation or removal of the CAA building at Madrona, the removal of

the corral and park housing at Madrona, and the new exhibits and interpretive media installed in the Rincon Mountain visitor center and at key locations around the park. The removal of nonhistoric facilities at Manning Camp would create long-term moderate beneficial effects on park operations.

As long as increases in parking areas and availability were proportionate to user capacity thresholds for the park and this new development does not create a larger management problem in the long run as a result of increased use, it is expected that long-term effects would be minor beneficial under alternative 3.

THE NEXT STEPS

After the distribution of the *Draft General Management Plan / Environmental Impact Statement* there will be a 60-day public review and comment period after which the NPS planning team will evaluate comments from other federal agencies, tribes, organizations, businesses, and individuals regarding the draft plan and incorporate appropriate changes into a *Final General Management Plan / Environmental Impact Statement*. The final plan will include letters from governmental agencies, any substantive comments on the draft document, and NPS responses to those comments. Following distribution of the *Final General Management Plan / Environmental Impact Statement* and a 30-day no-action period, a record of decision will be signed by the NPS regional director. The record of decision documents the NPS selection of an alternative for implementation. With the signed record of decision, the plan can then be implemented, depending on funding and staffing.

However, a record of decision does not guarantee funds and staff for implementing the approved plan. Actions directed by general management plans or in subsequent implementation plans are accomplished over time. Budget restrictions, requirements for additional data or regulatory compliance, and competing national park system priorities could prevent immediate implementation of many actions. Major or especially costly actions could be implemented 10 or more years into the future.

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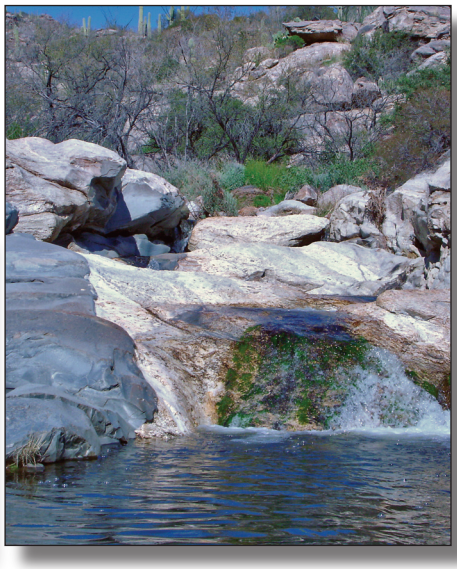
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Introduction, Purpose And Need







A GUIDE TO THIS DOCUMENT

This *Draft General Management Plan / Environmental Impact Statement* is organized in accordance with the Council on Environmental Quality's implementing regulations for the National Environmental Policy Act and the National Park Service's Director's Orders on "Park Planning" (DO-2) and "Conservation Planning, Envrionmental Impact Analysis, and Decision Making" (DO-12).

Chapter 1: Introduction sets the framework for the entire document. It describes why the plan is being prepared and what needs it must address. It gives guidance for the alternatives that are being considered, which are based on the national park's legislated mission, its purpose, the significance of its resources, special mandates and administrative commitments, servicewide mandates and policies, and other planning efforts in the area.

The chapter also details the planning opportunities and issues that were raised during public scoping meetings and initial planning team efforts (see insert box below); the alternatives in the next chapter address these issues and concerns to varying degrees. This chapter concludes with a statement of the scope of the environmental impact analysis — specifically what impact topics were or were not analyzed in detail.

Chapter 2: Alternatives, Including the Preferred Alternative, begins by describing the management prescriptions that will be used to manage the national park in the future. It also consists of the continuation of current management and trends in the park (alternative 1, the no-action alternative). The preferred alternative, alternative 2, and then alternative3 are presented. Mitigating measures proposed to minimize or eliminate the impacts of some proposed actions are described just before the discussion of future studies and/or implementation plans that will be needed. The evaluation of the environmentally preferred alternative is followed by summary tables of the alternative actions and the environmental consequences of implementing those alternative actions. The chapter concludes with a discussion of alternatives or actions that were dismissed from detailed evaluation.

Chapter 3: The Affected Environment describes those areas and resources that would be affected by implementing actions in the various alternatives – natural resources, cultural resources, visitor experience, the socioeconomic environment, transportation, and park operations and facilities.

Chapter 4: Environmental Consequences analyzes the impacts of implementing the alternatives on topics described in the "Affected Environment" chapter. Methods that were used for assessing the impacts in terms of the intensity, type, and duration of impacts are outlined at the beginning of the chapter.

Chapter 5: Consultation and Coordination describes the history of public and agency coordination during the planning effort and any future compliance requirements; it also lists agencies and organizations who will be receiving copies of the document.

The **Appendixes** present supporting information for the document, along with references, a glossary, and a list of the planning team and other consultants.

> The primary goal of **scoping** is to identify issues and determine the range of alternatives to be addressed. During scoping, the NPS staff provides an overview of the proposed project, including purpose and need and alternatives. The public is asked to submit comments, concerns, and suggestions relating to these goals.

PURPOSE AND NEED FOR THE PLAN

Why We Do General Management Planning

The National Parks and Recreation Act of 1978 requires for each unit of the National Park Service (NPS) to have a general management plan (GMP), and NPS *Management Policies 2006* states "[t]he Service will maintain a general management plan for each unit of the national park system" (2.3.1 General Management Planning). But what is the value, or usefulness, of general management planning?

The purpose of a general management plan is to ensure that a national park system unit has a clearly defined direction for resource preservation and visitor uses to best achieve the National Park Service's mandate to preserve resources unimpaired for the enjoyment of future generations. In addition, general management planning makes the National Park Service more effective, collaborative, and accountable by

- providing a balance between continuity and adaptability in decision making — Defining the desired conditions to be achieved and maintained in a park unit provides a touchstone that allows NPS managers and staff to constantly adapt their actions to changing situations while staying focused on what is most important about the park unit.
- analyzing the park unit in relation to its surrounding ecosystem, cultural setting, and community — This helps NPS managers and staff understand how the park unit can interrelate with neighbors and others in ways that are ecologically, socially, and economically sustainable. Decisions made within such a larger context are more likely to be successful over time.
- affording everyone who has a stake in decisions affecting a park unit an opportunity to be involved in the planning process and to understand the decisions that are made — National park system units are often the focus of intense public interest. Public involvement throughout the planning process provides focused opportunities for NPS managers and staff to interact with the public and learn about public concerns, expectations, and values. Public involvement also provides opportunities for NPS managers and staff to share information about the park unit's purpose and significance, as well as opportunities and constraints for the management of park unit lands.

The ultimate outcome of general management planning for national park system units is an agreement among the National Park Service, its partners, and the public on why each area is managed as part of the national park system, what resource conditions and visitor experience should exist there, and how those conditions can best be achieved and maintained over time.

INTRODUCTION

This *Draft General Management Plan / Environmental Impact Statement* presents and analyzes three alternative future directions for the management and use of Saguaro National Park. Alternative 2 is the National Park Service's preferred alternative. The potential environmental impacts of all alternatives have been identified and assessed.

General management plans are intended to be long-term documents that establish and articulate a management philosophy and framework for decision making and problem solving in the parks. This general management

plan will provide guidance for the next 25 years.

BACKGROUND

Saguaro National Park was established by President Hoover on March 1, 1933. Originally named Saguaro National Monument, the name was changed to Saguaro National Park by an act of Congress on October 14, 1994 (see appendix A). Wilderness was designated in 1976, and boundary changes have taken place in 1961, 1976, 1991, and 1994. The park has 91,445.96 acres with 4,289.79 acres being in nonfederal ownership and 87,156.17 acres being in federal ownership. Designated wilderness includes 71,400 acres.

Lands have been added to the park since wilderness designation in 1976. These are referred to as the expansion areas in this document. (See the wilderness maps in appendix F for more details.)

BRIEF DESCRIPTION OF THE PARK

This mountainous park has two districts — the Rincon Mountain District east of Tucson and the Tucson Mountain District west of Tucson. Both districts of the park are in Pima County, Arizona, and are separated by the city of Tucson. The Rincon Mountain District is bordered on the east and portions of the north and south by the Coronado National Forest. Residential developments border sections of the western, southwestern, and northwestern boundaries of this district. The Tucson Mountain District is bordered primarily by Tucson Mountain Park on the south and residential development on the north, east, and west.

In 2004, Pima County had a population of approximately 885,000, and the city of Tucson's population was nearly 495,000 residents (U.S. Census Bureau 2006a). The city is growing rapidly both in terms of population and land area. Between 1990 and 2000, the area of land within Tucson city limits increased by more than 25% through the annexation of more than 40 square miles of unincorporated Pima County during the decade (City of Tucson 2002). When the park districts were created, dirt roads connected these distant protected areas to the city. The 30 miles separating the two park districts are now completely filled by the city of Tucson. The trend has been expanding urbanization outward from the city core and the city limits have expanded to abut the park boundaries in some locations. Today, the park districts have become islands of wildness in a sea of urban development.

Saguaro National Park protects a superb example of the Sonoran Desert ecosystem, featuring exceptional stands of saguaro cacti, important wildlife habitat, critical riparian areas, and associated mountains. Saguaro National Park also protects significant cultural resources, including national-register-listed or -eligible archeological resources, places important to American Indian cultural traditions, and historic structures.

A visit to Saguaro National Park allows visitors to come in close contact with one of the most interesting and unusual collections of desert life in the United States. Visitors of all ages are fascinated and enchanted by the desert giants, saguaro cacti, especially their many interesting and complex interrelationships with other desert life. The park provides exceptional opportunities for visitors to experience solitude and discover nature on their own, to educate people through close interaction with the environment, and to see the outstanding and diverse scenic features of this classic desert landscape.

Annual recreational visitation to the park has averaged around 700,000 in the last decade. The typical peak period of visitation at Saguaro is January through March. The



North

0 Km 5

0 Mi 5

Park Map

General Management Plan
Saguaro National Park

U.S. Department of the Interior • National Park Service
DSC / MAY 2006 / 151 / 20054

months with the lowest visitation levels are July and August. The heat of the desert makes the summer months less desirable for many of the activities offered at the park. Most of the park's visitors participate in day use activities such as hiking, walking, horseback riding, scenic driving, and educational programs. Due to the proximity of the park to Tucson, a large number of Saguaro's visitors are local to the area and have visited the park many times.

PURPOSE OF THE PLAN

The approved general management plan will be the basic document for managing Saguaro National Park for the next 25 years. The purposes of this general management plan are as follows:

- Confirm the purpose, significance, and special mandates of Saguaro National Park.
- Clearly define resource conditions and visitor uses and experiences to be achieved in the national park.
- Provide a framework for national park managers to use when making decisions about how to best protect national park resources, how to provide quality visitor uses and experiences, how to manage visitor use, and what kinds of facilities, if any, to develop in/near the national park.
- Ensure that this foundation for decision making has been developed in consultation with interested stakeholders and adopted by the NPS leadership after an adequate analysis of the benefits, impacts, and economic costs of alternative courses of action.

Legislation establishing the National Park Service as an agency and governing its management provides the fundamental direction for the administration of Saguaro National Park (and other units and programs of the national park system). This general management plan will build on these laws and the legislation that established Saguaro National Park to provide a vision for the park's future. The "Servicewide Mandates and Policies" section calls the reader's attention to topics that are important to understanding the management direction at the national park. The alternatives in this general management plan address the desired future conditions that are not mandated by law and policy and must be determined through a planning process.

The general management plan does not describe how particular programs or projects should be prioritized or implemented. Those decisions will be addressed in future more detailed planning efforts. All future plans will tier from the approved general management plan.

NEED FOR THE PLAN

This new management plan for Saguaro National Park is needed because the last comprehensive planning effort for the national park was completed in 1988. Much has occurred since 1988 — visitor use patterns and types have changed, the population of the city of Tucson has doubled, and an additional 7,577 acres have been added to the park. Each of these changes has major implications for how visitors access and use the national park and the facilities needed to support those uses, how resources are managed, and how the National Park Service manages its operations.

A general management plan also is needed to meet the requirements of the National Parks and Recreation Act of 1978 and NPS policy, which mandate development of a general management plan for each unit in the national park system.

THE NEXT STEPS

After the distribution of the *Draft General Management Plan / Environmental Impact Statement* there will be a 60-day public review

and comment period after which the NPS planning team will evaluate comments from other federal agencies, tribes, organizations, businesses, and individuals regarding the draft plan and incorporate appropriate changes into a *Final General Management Plan / Environmental Impact Statement*. The final plan will include letters from governmental agencies, any substantive comments on the draft document, and NPS responses to those comments. Following distribution of the *Final General Management Plan / Environmental Impact Statement* and a 30-day no-action period, a record of decision approving a final plan will be signed by the NPS regional director. The record of decision documents the NPS selection of an alternative for implementation. With the signing of the record of decision, the plan can then be implemented.

IMPLEMENTATION OF THE PLAN

The implementation of the approved plan will depend on future funding. The approval of a plan does not guarantee that the funding and staffing needed to implement the plan will be forthcoming. Full implementation of the approved plan could be many years in the future.

The implementation of the approved plan also could be affected by other factors. Once the general management plan has been approved, additional feasibility studies and more detailed planning and environmental documentation would be completed, as appropriate, before any proposed actions can be carried out. For example:

- Appropriate permits would be obtained before implementing actions that would impact wetlands.
- Appropriate federal and state agencies would be consulted concerning actions that could affect threatened and endangered species.
- Native American tribes and the state historic preservation office would be consulted.
- Appropriate NEPA documentation would be prepared.

The general management plan does not describe how particular programs or projects should be prioritized or implemented. Those decisions will be addressed during the more detailed planning associated with strategic plans, implementation, plans, etc. All of those future more detailed plans will tier from the approved general management plan and will be based on the goals, future conditions, and appropriate types of activities established in the approved general management plan.

Actions directed by general management plans or in subsequent implementation plans are accomplished over time. Budget restrictions, requirements for additional data or regulatory compliance, and competing national park system priorities could prevent immediate implementation of many actions. Major or especially costly actions could be implemented 10 or more years into the future.

GUIDANCE FOR THE PLANNING EFFORT

PURPOSE AND SIGNIFICANCE

Introduction

Saguaro National Park protects a superb example of the Sonoran Desert ecosystem, featuring exceptional stands of saguaro cacti, important wildlife habitat, critical riparian areas, and associated mountains. Saguaro National Park also protects significant cultural resources, including national-register-listed or -eligible archeological resources, places important to American Indian cultural traditions, and historic period structures.

Purpose

Purpose statements provide the foundation for the management and use of each unit of the national park system; they also reaffirm the reasons why each area was established as a unit of the national park system. These statements help neighbors, visitors, cooperating agencies, and other users understand the framework in which park managers make decisions.

The following purpose statements have been refined over time and are based on Saguaro's establishing legislation as well as laws and policies governing management of all national park system units.

Purpose Statements

- Preserve and protect the saguaro cactus and the diverse vegetation and wildlife habitat of the surrounding Sonoran Desert.
- Preserve and protect the mountain and riparian habitats associated with the Sonoran Desert in the Tucson and Rincon Mountains.
- Preserve and protect wilderness qualities such as solitude, natural quiet, scenic vistas, and natural conditions.
- Promote understanding and stewardship of Saguaro National Park's natural and cultural resources through appropriate scientific study.
- Provide opportunities to understand and enjoy Saguaro National Park in a manner that is compatible with the preservation of park resources and wilderness character.

Significance

Significance statements capture the essence of the national park's importance to our country's natural and cultural heritage. Significance statements do not inventory national park resources; rather, they describe the national park's distinctiveness and help to place the national park within its regional, national, and international contexts. Significance statements answer questions such as why are Saguaro National Park's resources distinctive? What do they contribute to our natural/cultural heritage? Defining the national park's significance helps managers make decisions that preserve the resources and values necessary to accomplish the national park's purpose.

The following are the significance statements for Saguaro National Park.

Significance Statements

- The saguaro cactus biotic community in the park is a superb example of the Sonoran Desert ecosystem because of the density and many generations of the saguaro cacti.
- The saguaro is the tallest cactus in the United States, and its distinctive form is

recognized worldwide as an icon of the American Southwest.
- The park contains abundant evidence of a wide range and long history of human interaction with the land, and has enormous potential for teaching contemporary people about adapting to and thriving in an arid environment.
- The park contains the largest roadless Sky Island in the Sonoran Desert, encompassing a wide range of elevations, which supports extraordinary biodiversity within a small geographic area.
- The juxtaposition of Saguaro National Park and a large urban community provides for easily accessed wilderness experiences and extensive educational opportunities.

FUNDAMENTAL RESOURCES AND VALUES

Fundamental resources and values warrant primary consideration during planning because they are critical to achieving the park's purpose and maintaining its significance. The resources and values below are central to managing the area and express the importance of the area to our natural and cultural heritage.

Natural Resources

- Saguaro Cacti
- Vegetative Types
  - Arizona upland (of Sonoran desertscrub)
  - desert grasslands
  - oaks woodland
  - pine-oak forest
  - ponderosa pine forest
  - mixed conifer forest
  - riparian vegetative types
- Geologic Resources
- Biodiversity
  - Natural disturbance regimes (fire, flood, erosion)
  - Ecological connections
  - Biological interactions— integrity of natural resource system (e.g. exotic vs. native populations, density of ground cover)
- Wildlife habitat connections
- Natural hydrology — quality, quantity, timing, distribution, recharge

Cultural Resources

- Archeological sites (Hokoham — 328 sites)
- Collection of CCC structures
- Manning Cabin
- Freeman Homestead
- Lime kilns
- Cactus Forest Drive

Visitor Experience

- Opportunities for solitude, getting away from the city
- Educating people through close interaction with the environment, including opportunities for self-discovery
- View outstanding and diverse scenic features of the classic desert landscape

PRIMARY INTERPRETIVE THEMES

Based on the park's purpose, significance, and primary resources, the following interpretive themes have been developed. Primary interpretive themes are the key stories, concepts, and ideas of a park. They are the groundwork that NPS staff will use for educating visitors about the park and for inspiring visitors to care for and about the park's resources. With these themes, visitors can form intellectual and emotional connections with park resources and experiences. Subsequent interpretive planning may elaborate on these primary themes. The following are the park's primary interpretive themes.

- The grand and mysterious saguaro cactus engages our imagination with immense size, longevity, and fascinating biology as

well as cultural significance and human-like qualities.
- Inhabiting the Sonoran Desert for centuries has required different people to adapt to this environment and has led to impacts and changes to the desert resources.
- As a unit of the national park system, Saguaro National Park preserves and protects thousands of acres of wilderness, offering recreation, learning, and spiritual renewal amid the impacts of an exploding urban center. All who enjoy Saguaro National Park play a role in the stewardship of this unique resource.
- From arid desert to lush coniferous forest, the incredible diversity of plant and animal life of the Sonoran Desert is exemplified within Saguaro National Park.
- The plants and animals of Saguaro National Park have developed a variety of fascinating physical features, physiological mechanisms, and special behaviors to adapt and survive in the arid environment of the Sonoran Desert.
- An amazing variety of unique and complex geological processes took place to create the landforms of the park and the surrounding region.

SPECIAL MANDATES AND ADMINISTRATIVE COMMITMENTS

Special mandates and administrative commitments refer to park-specific requirements. These formal agreements are often established concurrently with the creation of a unit of the national park system. For Saguaro National Park these include the following:

Life Estates

A life estate or reservation of use and occupancy for a 40-acre parcel of property in the Rincon Mountain District is still in effect.

Encumbrances

A Master Deed Listing shows various encumbrances on lands purchased or transferred from the Bureau of Land Management. These encumbrances include minerals, roads, ditches, and power lines. Most of the encumbrance dates are indefinite.

Mining Sites

Evidence of intense mining activity in the Tucson Mountain District is visible throughout the area; which was closed to mineral entry in 1929. All open shafts have been fenced and posted to comply with Arizona Revised Statutes. Mining sites have not been evaluated in terms of national register criteria.

SERVICEWIDE LAWS AND POLICIES

This section (expanded in appendix B) identifies what must be done at Saguaro National Park to comply with federal laws and policies of the National Park Service. Many park management directives are specified in laws and policies guiding the National Park Service and are therefore not subject to alternative approaches. For example, there are laws and policies about managing environmental quality (such as the Clean Air Act, the Endangered Species Act, and Executive Order 11990 "Protection of Wetlands"); laws governing the preservation of cultural resources (such as the National Historic Preservation Act and the Native American Graves Protection and Repatriation Act); and laws about providing public services (such as the Americans with Disabilities Act) — to name only a few. In other words, a general management plan is not needed to decide, for instance, that it is appropriate to protect endangered species, control exotic species, protect archeological sites, conserve artifacts, or provide for handicap access. Laws and policies have already decided those and many other things for us. Although attaining some

of these conditions set forth in these laws and policies may have been temporarily deferred in the park because of funding or staffing limitations, the National Park Service will continue to strive to implement these requirements with or without a new general management plan.

Some of these laws and executive orders are applicable solely or primarily to units of the national park system. These include the 1916 Organic Act that created the National Park Service, the General Authorities Act of 1970, the act of March 27, 1978, relating to the management of the national park system, and the National Parks Omnibus Management Act (1998). Other laws and executive orders have much broader application, such as the Endangered Species Act, the National Historic Preservation Act, and Executive Order 11990 that address the protection of wetlands (see appendixes B and C).

The NPS Organic Act (16 USC § 1) provides the fundamental management direction for all units of the national park system:

> [P]romote and regulate the use of the Federal areas known as national parks, monuments, and reservations…by such means and measure as conform to the fundamental purpose of said parks, monuments and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.

The National Park System General Authorities Act (16 USC § 1a-1 et seq.) affirms that while all national park system units remain "distinct in character," they are "united through their interrelated purposes and resources into one national park system as cumulative expressions of a single national heritage." The act makes it clear that the NPS Organic Act and other protective mandates apply equally to all units of the system. Further, amendments state that NPS management of park units should not "derogat[e]…the purposes and values for which these various areas have been established."

The National Park Service also has established policies for all units under its stewardship. These are identified and explained in a guidance manual entitled NPS *Management Policies 2006*. The "action" alternatives (alternatives 2 and 3) considered in this document incorporate and comply with the provisions of these mandates and policies.

Public Law 95-625, the National Park and Recreation Act, requires the preparation and timely revision of general management plans for each unit of the national park system. Section 604 of that act outlines several requirements for general management plans, including measures for the protection of the area's resources and "indications of potential modifications to the external boundaries of the unit and the reasons therefore." NPS *Management Policies* adopted in 2006 reaffirm this legislative directive.

To truly understand the implications of an alternative, it is important to combine the servicewide mandates and policies with the management actions described in an alternative.

Table 1 shows some of the most pertinent servicewide mandates and policy topics related to planning and managing Saguaro National Park; across from each topic are the *desired conditions that the staff is striving to achieve* for that topic and thus the table is written in the present tense. Appendix B expands on this information by citing the law or policy directing these actions and giving examples of the types of actions being pursued by NPS staff. The alternatives in this general management plan address the desired future conditions that are not mandated by law and policy and must be determined through a planning process.

TABLE 1: SERVICEWIDE MANDATES AND POLICIES PERTAINING TO SAGUARO NATIONAL PARK

TOPIC	Current Laws and Policies Require That the Following Conditions Be Achieved at Saguaro National Park
Relations with Private and Public Organizations, Owners of Adjacent Land, and Governmental Agencies	The national park is managed as part of a greater ecological, social, economic, and cultural system. Good relations are maintained with adjacent landowners, surrounding communities, and private and public groups that affect, and are affected by, the park. The park is managed proactively to resolve external issues and concerns and ensure that park values are not compromised. Because the national park is an integral part of a larger regional environment, the National Park Service works cooperatively with others to anticipate, avoid, and resolve potential conflicts, protect national park resources, and address mutual interests in the quality of life for community residents. Regional cooperation involves federal, state, and local agencies, Indian tribes, neighboring landowners, and all other concerned parties.
Government-to-Government Relations between American Indian Tribes and Saguaro National Park	The National Park Service and tribes culturally affiliated with the park maintain positive, productive, government-to-government relationships. Park managers and staff respect the viewpoints and needs of the tribes, continue to promptly address conflicts that occur, and consider American Indian values in park management and operation.
	Natural Resources
Air Quality	Air quality in the park meets national ambient air quality standards for specified pollutants. The park's air quality is maintained or enhanced with no significant deterioration. Nearly pristine views of the landscape both within and outside the park are present. Scenic views are also nearly pristine.
Backcountry	Backcountry use is managed in accordance with a backcountry management plan (or other plan addressing backcountry uses) that is designed to avoid unacceptable impacts on park resources or adverse affects on visitor enjoyment of appropriate recreational experiences. The Park Service seeks to identify acceptable limits of impacts, monitors backcountry use levels and resource conditions, and takes prompt corrective action when unacceptable impacts occur.
Ecosystem Management	The park is managed holistically, as part of a greater ecological, social, economic, and cultural system.
Exotic Species	The management of populations of exotic plant and animal species, up to and including eradication, are undertaken wherever such species threaten park resources or public health and when control is prudent and feasible.
Fire Management	Park fire management programs are designed to meet resource management objectives prescribed for the various areas of the park and to ensure that the safety of firefighters and the public are not compromised. All wildland fires are effectively managed, considering resource values to be protected and firefighter and public safety, using the full range of strategic and tactical operations as described in an approved fire management plan.

TOPIC	Current Laws and Policies Require That the Following Conditions Be Achieved at Saguaro National Park
Floodplains	Natural floodplain values are preserved or restored. Long-term and short-term environmental effects associated with the occupancy and modification of floodplains are avoided. When it is not practicable to locate or relocate development or inappropriate human activities to a site outside the floodplain or where the floodplain will be affected, the National Park Service • Prepares and approves a statement of findings in accordance with DO 77-2. • Uses nonstructural measures as much as practicable to reduce hazards to human life and property while minimizing impacts on the natural resources of floodplains. • Ensures that structures and facilities are designed to be consistent with the intent of the standards and criteria of the National Flood Insurance Program (44 CFR 60).
General Natural Resources / Restoration	Native species populations that have been severely reduced in or extirpated from the park are restored where feasible and sustainable. Populations of native plant and animal species function in as natural condition as possible except where special considerations are warranted.
Geologic Resources	The park's geologic resources are preserved and protected as integral components of the park's natural systems. The Park Service manages caves and karst in accordance with approved cave management plans to perpetuate the natural systems associated with the caves and karst.
Land Protection	Land protection plans are prepared to determine and publicly document what lands or interests in land need to be in public ownership, and what means of protection are available to achieve the purposes for which the national park system unit was created.
Lightscape Management/ Night Sky	Excellent opportunities to see the night sky are available. Artificial light sources both within and outside the park do not unacceptably adversely affect opportunities to see the night sky.
Native Vegetation and Animals	The National Park Service will maintain as parts of the natural ecosystem, all native plants and animals in the park.
Soundscapes	The National Park Service preserves the natural ambient soundscapes, restores degraded soundscapes to the natural ambient condition wherever possible, and protects natural soundscapes from degradation due to human-caused noise. Disruptions from recreational uses are managed to provide a high-quality visitor experience in an effort to preserve or restore the natural quiet and natural sounds
Soils	The National Park Service actively seeks to understand and preserve the soil resources of the park, and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil, or its contamination of other resources. Natural soil resources and processes function in as natural a condition as possible, except where special considerations are allowable under policy.
Threatened and Endangered Species and Species of Concern	Federal and state-listed threatened and endangered species and their habitats are protected and sustained. Native threatened and endangered species populations that have been severely reduced in or extirpated from the park are restored where feasible and sustainable.

Table 1: Servicewide Mandates and Policies Pertaining to Saguaro National Park

TOPIC	Current Laws and Policies Require That the Following Conditions Be Achieved at Saguaro National Park
Water Resources	Surface water and groundwater are protected, and water quality meets or exceeds all applicable water quality standards. NPS and NPS-permitted programs and facilities are maintained and operated to avoid pollution of surface water and groundwater.
Wetlands	The natural and beneficial values of wetlands are preserved and enhanced. The National Park Service implements a "no net loss of wetlands" policy and strives to achieve a longer-term goal of net gain of wetlands across the national park system through the restoration of previously degraded wetlands. The National Park Service avoids to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and avoids direct or indirect support of new construction in wetlands wherever there is a practicable alternative. The National Park Service compensates for remaining unavoidable adverse impacts on wetlands by restoring wetlands that have been previously degraded.
Wilderness	The park ensures that wilderness characteristics and values are retained and protected, that visitors continue to find opportunities for solitude and primitive, unconfined recreation, and that signs of people remain substantially unnoticeable.
Cultural Resources	
Archeological Resources	Archeological sites are identified and inventoried and their significance is determined and documented. Archeological sites are protected in an undisturbed condition unless it is determined through formal processes that disturbance or natural deterioration is unavoidable. When disturbance or deterioration is unavoidable, the site is professionally documented and excavated and the resulting artifacts, materials, and records are curated and conserved in consultation with the Arizona state historic preservation office (and American Indian tribes if applicable). Some archeological sites that can be adequately protected may be interpreted to the visitor.
Historic Structures	Historic structures are inventoried and their significance and integrity are evaluated under National Register of Historic Places criteria. The qualities that contribute to the listing or eligibility for listing of historic structures on the national register are protected in accordance with the *Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation* (unless it is determined through a formal process that disturbance or natural deterioration is unavoidable).

TOPIC	Current Laws and Policies Require That the Following Conditions Be Achieved at Saguaro National Park
Ethnographic Resources	Appropriate cultural anthropological research is conducted in cooperation with groups associated with the park. The National Park Service accommodates access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoids adversely affecting the physical integrity of these sacred sites. NPS general regulations on access to and use of natural and cultural resources in the national park are applied in an informed and balanced manner that is consistent with national park purposes and does not unreasonably interfere with American Indian use of traditional areas or sacred resources and does not result in the degradation of national park resources. American Indians and other individuals and groups linked by ties of kinship or culture to ethnically identifiable human remains, sacred objects, objects of cultural patrimony, and associated funerary objects are consulted when such items may be disturbed or are encountered on park lands. Access to sacred sites and park resources by American Indians continues to be provided when the use is consistent with park purposes and the protection of resources. All ethnographic resources determined eligible for listing or listed on the national register are protected. If disturbance of such resources is unavoidable, formal consultation with the state historic preservation officer, the Advisory Council on Historic Preservation, and with American Indian tribes as appropriate, is conducted. The April 29, 1994, Presidential memorandum on "Government-to-Government Relations with Native American Tribal Governments," codified at 3 CFR 1007 (1995), states in part, "Each executive department and agency shall consult, to the greatest extent practicable and to the extent permitted by law, with tribal governments before taking actions that affect federally recognized tribal governments. All such consultations are to be open and candid, and confidential as needed, so that all interested parties may evaluate for themselves the potential impact of relevant proposals." In addition to the inadvertent discoveries of cultural resources, NPS *Management Policies 2006* states in part that a park's "traditionally associated peoples should be consulted about . . . other proposed NPS actions that may affect the treatment of, use of, and access to park resources with cultural meaning to a group."
Cultural Landscapes	Cultural landscape inventories are conducted to identify landscapes potentially eligible for listing in the national register, and to assist in future management decisions for landscapes and associated resources, both cultural and natural. The management of cultural landscapes focuses on preserving the landscape's physical attributes, biotic systems, and uses when those uses contribute to its historical significance. Treatments are based on sound preservation practices for the preservation, rehabilitation, restoration, or reconstruction of cultural landscapes is undertaken in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*.

Table 1: Servicewide Mandates and Policies Pertaining to Saguaro National Park

TOPIC	Current Laws and Policies Require That the Following Conditions Be Achieved at Saguaro National Park
Museum Collections	All museum collections (prehistoric and historic objects, artifacts, works of art, archival documents, and natural history specimens are identified and inventoried, catalogued, documented, preserved, and protected, and provision is made for access to and use of items in the collections for exhibits, research, and interpretation in consultation with traditionally associated groups. The qualities that contribute to the significance of collections are protected in accordance with established standards.
Visitor Use and Experience	
Visitor Use and Experience and Park Use Requirements	Park resources are conserved "unimpaired" for the enjoyment of future generations. Visitors have opportunities for types of enjoyment that are uniquely suited and appropriate to the superlative natural and cultural resources found in the park. No activities occur that would cause derogation of the values and purposes for which the park was established. For all zones, districts, or other logical management divisions within the park, the types and levels of visitor use are consistent with the desired resource and visitor experience conditions prescribed for those areas consistent with the unit's purpose. Park visitors will have opportunities to understand and appreciate the significance of the park and its resources, and to develop a personal stewardship ethic by directly relating to the resources. To the extent feasible, programs, services, and facilities in the park are accessible to and usable by all people, including those with disabilities within an inviting atmosphere accessible to every segment of American society.
Commercial Services	Same as Visitor Use and Experience and Park Use Requirements above. All commercial services must be authorized, must be necessary and/or appropriate, and must be economically feasible. Appropriate planning must be done to support commercial services authorization.
Public Health and Safety	While recognizing that there are limitations on its capability and constraints imposed by the Organic Act to not impair resources, the service and its concessioners, contractors and cooperators will seek to provide a safe and healthful environment for visitors and employees. The park staff will strive to identify recognizable threats to safety and health and protect property by applying nationally accepted standards. Consistent with mandates and nonimpairment, the park staff will reduce or remove known hazards and/or apply appropriate mitigative measures, such as closures, guarding, gating, education, and other actions.

TOPIC	Current Laws and Policies Require That the Following Conditions Be Achieved at Saguaro National Park
	Other Topics
Sustainable Design/ Development	NPS and concessioner visitor management facilities are harmonious with park resources, compatible with natural processes, aesthetically pleasing, functional, as accessible as possible to all segments of the population, energy-efficient, and cost-effective. All decisions regarding park operations, facilities management, and development in the park — from the initial concept through design and construction — reflect principles of resource conservation. Thus, all park developments and park operations are sustainable to the maximum degree possible and practical. New developments and existing facilities are located, built, and modified according to the *Guiding Principles of Sustainable Design* (NPS 1993) or other similar guidelines. Management decision-making and activities throughout the national park system should use value analysis, which is mandatory for all Department of the Interior bureaus, to help achieve this goal. Value planning, which may be used interchangeably with value analysis/value engineering/value management, is most often used when value methods are applied on general management or similar planning activities.
Transportation to and within the Park	Visitors have reasonable access to the park, and there are connections from the park to regional transportation systems as appropriate. Transportation facilities in the park provide access for the protection, use, and enjoyment of park resources. They preserve the integrity of the surroundings, respect ecological processes, protect park resources, and provide the highest visual quality and a rewarding visitor experience. The National Park Service participates in all transportation planning forums that may result in links to parks or impact park resources. Working with federal, tribal, state, and local agencies on transportation issues, the National Park Service seeks reasonable access to parks, and connections to external and alternative transportation systems.
Utilities and Communication Facilities	Park resources or public enjoyment of the park are not denigrated by nonconforming uses. Telecommunication structures are permitted in the park to the extent that they do not jeopardize the park's mission and resources. No new nonconforming use or rights-of-way are permitted through the park without specific statutory authority and approval by the director of the National Park Service or his representative, and are permitted only if there is no practicable alternative to such use of NPS lands.

OTHER PLANNING EFFORTS RELATED TO THIS GENERAL MANAGEMENT PLAN

Saguaro National Park is in Tucson, Arizona. Properties surrounding the park are primarily privately owned residential and agricultural lands. There are a few commercial and state-owned parcels.

Several plans have influenced or would be influenced by the approved *General Management Plan* for Saguaro National Park. These plans have been prepared (or are being prepared) by the National Park Service, the county, and the state of Arizona.

At an early meeting, local, state, and federal, partners were invited to share their ongoing planning projects pertinent to Saguaro's general management plan as well as regional planning efforts. Appendix D contains a detailed list of these plans.

The following highlights those plans most relevant to this general management plan. Most relate to park roads and transportation in the park.

Cactus Forest Trail Environmental Assessment, Saguaro National Park, Arizona. Denver, Colorado: Intermountain Regional Office, National Park Service, (2002)

2030 Regional Transportation Plan, March 26, 2003. Tucson, Arizona: Pima Association of Governments.

"2030 Regional Transportation Plan, Vision and Goals. April 2003." Tucson, Arizona: Pima Association of Governments.

Regional Transportation Improvement Plan, 2003-2007. Tucson, Arizona: Pima Association of Governments.

Regional Transportation Improvement Plan, 2004-2008. Tucson, Arizona: Pima Association of Governments.

Saguaro National Park Transportation and Visitor Use Study. David Evans and Associates (2006)

Saguaro National Park Comprehensive Trails Plan / Environmental Assessment (in progress). See following description for more detail.

Saguaro National Park has begun a comprehensive trails plan, which is being conducted in close coordination with this general management plan. The general management plan is an "umbrella" plan that provides comprehensive direction and a foundation for decision making over a 20- to 25-year period. The plan is deeply grounded in the park's enabling legislation and mission as well as resource conditions and visitor experiences that are to be achieved and maintained over time.

Tiering from the foundation and direction established in the general management plan, the comprehensive trails plan will include details such as site design; specific treatments for resources; locations of any new trails, trailheads, and parking lots; and types and locations of interpretive exhibits and signs. Because there is a pressing need, the comprehensive trails plan is beginning before the general management plan has been completed. A newsletter about the trails plan was sent out in February 2006 presenting the general management plan's preferred alternative. This newsletter requested comments on both the general

management plan's preferred alternative and trails issues. Although the two plans are separate, the comprehensive trails plan must reflect the management prescriptions chosen in the approved *General Management Plan*. The comprehensive trails plan, however, cannot be completed until after a general management plan (one of the alternatives in this general management plan) has been approved. Once the general management plan has been completed, the comprehensive trails plan can be expediently implemented.

Following are the trail system objectives.

1. Protect natural and cultural resources.
2. Provide reasonable access to the trails network and trailheads.
3. Eliminate unnecessary and parallel/duplicate trails.
4. Ensure that the resulting trails network is safe and maintainable.
5. Provide for a clearly designated trail system.
6. Provide for a variety of trail experiences.

For more information related to trail system criteria and types, see appendix E.

PLANNING ISSUES/CONCERNS

INTRODUCTION

The NPS staff, general public, focus groups, local and county government representatives, and other federal agency staff identified various issues and concerns during scoping (early information gathering) for this general management plan. An issue is defined as an opportunity, conflict, or problem regarding the use or management of public lands. Comments were solicited at public meetings, through planning newsletters, and on the Saguaro National Park's Web site (see the "Consultation and Coordination" chapter).

Comments received during scoping demonstrated the public likes many things about the national park — its management, use, and facilities. The issues and concerns generally involve protecting park resources from increasing urban growth in the Tucson area and determining the appropriate visitor use, types and levels of facilities, services, and activities while remaining compatible with desired resource conditions. The general management plan alternatives provide strategies for addressing the issues within the context of the Saguaro's purpose, significance, and special mandates.

DECISION POINTS AND CONSIDERATIONS

Many aspects of the desired future conditions of Saguaro National Park are defined in the establishing legislation, the park's purpose and significance statements, and established laws and policies. The resolution of questions or issues that have not already been addressed by legislation or laws and policies are the basis for developing different alternatives or approaches to managing the park into the future, because usually there is more than one way an issue could be resolved. As with any decision-making process, there are key decisions that, once made, will dictate the direction of subsequent management strategies. Based on public and partner comments and NPS concerns, the following six major decision points were identified for Saguaro National Park. The bullets following each decision point reflect the various concerns that need to be addressed. This information is based on internal or external comments received or information supported by research and/or management experience.

1. What are the appropriate types of resource protection strategies that the National Park Service should use while providing visitors with the opportunity to experience and learn about the resources?

- The majority of the park is designated wilderness, and managing for wilderness values is challenging in light of the increasing demand being placed on the park from a growing urban population.
- When visitors travel off designated trails, they can impact sensitive resources.
- Resources are being lost because of vandalism and theft.
- The high density of trails in some areas of wilderness may not be consistent with wilderness mandates.
- Resources such as saguaro forest, riparian areas, and other habitats for threatened and endangered species are particularly sensitive to visitor use.
- Facility locations can affect the park's ability to manage for quality wildlife habitat.
- Poorly designed and unmanaged trails can lead to erosion and other resource impacts.
- Increasing the park's development footprint to accommodate increasing use may impact important park resources.
- The Madrona/Chimenea area is an extremely fragile riparian habitat.
- Development along park boundaries is threatening scenic viewsheds and night

skies and contributing to invasive species encroachment.
- The public has expressed concerns about a reduction in recreation opportunities.

2. What is the appropriate kind of vehicle traffic that is compatible with protecting park resources and visitor experiences?

- High volumes and speeds of commuting traffic impacts resources, especially wildlife.
- High volumes and speeds of commuting traffic pose safety threats to visitors and their park experiences.
- Many people enjoy driving through the park and consider the drive a great scenic experience.
- Other opportunities for accommodating commuting traffic in the area are or will be available to commuters and need to be considered to reduce the volume of traffic on park roads.
- Roads and traffic impact the designated wilderness located on either side of the roads.

3. What is the appropriate message for interpretation and educational activities inside the park vs. outside the park?

- Partnerships with local and regional educational institutions could support resource-related educational opportunities inside and outside the park.
- The Rincon Mountain District visitor center and parking area are too small and outdated for current demands.

4. What are different ways that the National Park Service can meet its obligation to maintain biodiversity and optimize habitat values for native species?

- Increasing urbanization in the region greatly influences wildlife habitat and connections. The park plays a significant role in protecting a core area of high-quality habitat. The park's proximity to other large public lands makes protection of corridors important.
- Visitor use levels and behavior can impact natural ecosystems.
- The placement of park facilities can affect wildlife habitat and connections.
- Collaborating with other regional entities could promote wildlife values.
- Some large animals that live in the park have habitat requirements that reach beyond park boundaries.
- The park contains an abundance of diverse plant life and riparian areas that are necessary for the preservation of saguaro cacti.
- Urban development and visitor use has the potential to increase invasive species.

- 5. What are appropriate ways of using and managing the Manning Camp and the Madrona/Chimenea pools areas?

- The fire management activities at Manning Camp may impact wilderness and natural resource values.
- Manning Camp is a historic resource that needs to be protected.
- The Madrona/Chimenea area has highly diverse and sensitive natural resources that would be impacted by an increase in use.
- The current use levels near the Madrona/Chimenea area are very low, and there needs to be careful consideration of whether the resources could withstand additional visitor use.

6. What are the appropriate density, types, and use levels of trails in various parts of the park?

- More bicycling opportunities are desired by some members of the local community. Other members of the local community have expressed concerns over bicycle use due to visitor conflicts and resource impacts.
- Connections to regional trails are desired by some members of the local community.
- Any changes to the existing trail systems in the park need to be based on sound rationale, good site-specific information on plant species, potential wildlife habitat, and soil stability.

- Some conflicts exist between user groups on multiuse trails, especially between bicyclists and horseback riders.
- The density and location of trails can influence wildlife habitat viability and cultural resource protection.
- Poorly designed and unmanaged trails can lead to erosion and other resource impacts.
- The density of trails, levels of trail use, and types of trail activities in designated wilderness need to adhere to requirements of the Wilderness Act.
- Trail planning in the park should be considered in context of the supply and demand for trail opportunities in the local and regional area.

ISSUES

The following issues were identified for Saguaro National Park.

Natural Resources

Recent studies, data analysis, and scoping have identified several concerns that may influence the protection and management of the park's natural resources. Issues to be addressed in this plan related to natural resources are as follows.

Riparian Areas. With the addition of new park lands through legislation and acquisition in the 1990s, Saguaro National Park acquired management responsibility for an outstanding riparian corridor (Rincon Creek). The creek is an important resource because most of the park's wildlife species use these rich riparian corridors, which are increasingly rare in southern Arizona. Studies show that more than 80% of the bird species in Arizona use riparian areas as an important part of their habitat. It is important that this plan seek to protect riparian resources, which are unique to the desert environment.

Water Quality and Quantity. Protection of water quality and quantity, both surface and groundwater, is critical to support vegetation and wildlife in the park. Increasing urbanization around the park and increasing use inside the park may influence water use levels and water quality. The plan for the park needs to find ways to minimize impacts from increasing water use by surrounding landowners, and ensure that recreational facilities and activities are appropriately located and regulated to minimize impacts on water quality.

Threatened and Endangered Species and Species of Concern. The park is known to contain three species on the U.S. Fish and Wildlife Service list of threatened and endangered species — Mexican spotted owl, yellow-billed cuckoo, and lesser long-nosed bat. The park also contains excellent habitat for the cactus ferruginous pygmy-owl, a state species of special concern, although none have been confirmed in park boundaries since 1995. These and other species are the subject of the *Sonoran Desert Conservation Plan* developed by Pima County. Fourteen of the 54 species being considered as vulnerable in that plan live in Saguaro National Park. The management plan needs to protect listed species and critical habitat that exist in the park to aid recovery of the species and meet Endangered Species Act requirements. To meet this goal, the park also needs to partner with other federal agencies, Pima County, other local governments, and various non-profit groups to develop strategies that will protect these species.

Wilderness Use. There is a need to evaluate existing uses in designated wilderness for their appropriateness in supporting wilderness values. For example, the fire management activities at Manning Camp in the Rincon Mountain District may impact wilderness and natural resource values. These uses need to be evaluated and alternative sites for the uses considered.

Wildlife Habitat and Corridors. Habitat fragmentation and isolation of park habitats due to an expanding population and

residential growth is increasing along the park boundary. Plans for the park need to consider how the park can cooperatively manage habitat with surrounding public lands.

Fire Management. Most of the park's five major vegetation communities are susceptible to fire. Establishing desired conditions for the natural fire regime is becoming increasingly important due to increasing urbanization, which may affect the way the park addresses fire management. Desired conditions of the natural fire regime are needed to provide the basis for the updated fire management plan and to help educate the public about the role of fire.

Erosion and Debris Flows. Thunderstorms occasionally wash out roads and trails and deposit debris, especially in the Tucson Mountain Unit. Unpaved roads and trails in the park are impacted by debris flows every few summers, less so for paved roads. Although debris flows in the Tucson Mountains are not large, those occurring near roads and trails should be considered in road and trail construction and maintenance. Culverts associated with the roads are responsible for head-cut erosion. Studies of these processes are ongoing.

Cultural Resources

Saguaro National Park protects significant cultural resources, including national-register listed or eligible archeological resources, historic structures, cultural landscapes, and ethnographic resources as traditional cultural properties where American Indians practice traditions of their cultures. Recent studies, data analysis, and scoping have identified several concerns that may influence protection and management of the park's cultural resources. Issues to be addressed in this plan related to cultural resources are as follows.

Archeological Resources. Increasing visitor use and interest in archeological resources may lead to impacts of sites. The plan needs to address how to best protect archeological resources in different areas of the park. Also, the plan needs to determine the appropriate level of interpretation and visitor access, if any, to the sites.

Historic Structures and Cultural Landscapes. The 1987 historic resource study recommends several properties for eligibility to the National Register of Historic Places. The plan needs to consider such places as listed in or eligible for listing in the national register and address how to best further identify, protect, preserve, and use both historic structures and cultural landscapes. Specifically, the use of Manning Cabin for fire management and other activities needs to be assessed.

Traditional Uses. The park resources are important to Native American cultures in the region. The plan needs to include consultation with associated tribes to determine how best to accommodate traditional ceremonial uses, such as the Saguaro fruit-gathering.

Visitor Opportunities and Experience

A visit to Saguaro National Park allows visitors to be near one of the most interesting and unusual collections of desert life in the United States. The park provides outstanding opportunities for solitude and getting in touch with nature, and educating people through close interaction with the environment, including opportunities for discovery and to see outstanding and diverse scenic features of the classic desert landscape. Increasing visitor use and changing demands for visitor activities may have implications for future visitor use management strategies. Issues to be addressed in this plan related to visitor use and experience are as follows.

Visitor Use. Park visitation has increased more than 50% since the 1988 *General Management Plan*, with most of the increase from local and regional visitors. Park use can

be expected to continue to increase as Tucson attracts more visitors and residents. The park's proximity to the growing population of Tucson may make protecting wilderness values such as quiet and solitude more difficult. Also, some of the public have voiced concerns over future overuse and crowding throughout the park. The plan needs to consider how to manage visitor use levels by clearly identifying desired conditions for resources and visitor experiences and related management strategies.

Visitor Activities. There have been increasing demands for activities in the park, including new types of uses such as mountain bikes and an increased variety of access for the disabled. Also, there is a need to manage potential use conflicts between different types of users (e.g., hikers, horses, and bicyclists on the same trails). During public scoping, there were comments both supporting and opposing restrictions on certain types of recreational use, such as on the use of bicycles and horses. The plan needs to determine the amount, types and diversity of opportunities that the park can provide, while still promoting resource preservation and high-quality visitor experiences.

Visitor Access. With the continuing growth of Tucson and Pima County, there has been increased demand for new access points along the park boundary. In addition, visitors have requested more 24-hour access opportunities. The plan needs to systematically determine the most appropriate locations for visitor access to the park.

Wilderness Experiences. During public scoping, many respondents indicated that the wilderness values of the national park, such as naturalness, opportunities for self-discovery, quiet, scenic vistas, and solitude, made the park a unique and special place and it should be protected for such values. With increasing use levels, demands for new activities, and increasing urbanization along the park boundary, protecting wilderness values is becoming more difficult. The plan needs to address whether existing use patterns are commensurate with protecting wilderness values such as natural quiet and solitude in the high use areas of the wilderness (e.g., trails near Picture Rocks Road).

Interpretation/Education. The Rincon Mountain District visitor center was designed and built in the 1950s. The exhibits have had only superficial upgrades since then. Also, the facility cannot handle the volume of visitors that it now receives. In addition, the public commented during scoping that there was a need to expand interpretation/ education opportunities, including guided programs and opportunities outside the park boundaries (e.g., school partnerships). Further, the public noted the need for reaching out to diverse local communities for resource and cultural education opportunities, including improved meeting places in the park for school/ community programs. The plan needs to consider the appropriate amount and type of interpretation/education programs that are provided both inside and outside the park. Further, the plan needs to determine if additional facilities are needed to support orientation, interpretation, and education in the park and through partnerships.

Transportation

The heavily used commuter roads that bisect the Tucson Mountain District impact resources, especially in the form of roadkill and vegetation loss, and visitor experiences. The 1988 *General Management Plan* called for closure of Picture Rocks Road due to the considerable impacts on park resources. This action was never taken. Since 1988, commuter traffic on the road has increased as well as visitor use of the Tucson Mountain District. The increased volumes and speeds of traffic have led to increased wildlife mortality and more impacts on visitor experiences. During peak commuter traffic, visitors cannot enjoy a leisurely driving experience on these roads.

Most public input received during scoping expressed concern over the impacts from the high volumes of vehicle use and supported alternatives to managing the roads, including possible closures. There were also many comments that opposed any restrictions on commuter traffic, stating that road closures or other management strategies would result in undue hardship on the surrounding communities. The plan needs to develop and analyze alternatives for how to manage these major through-park roads to meet desired resource and visitor experience conditions.

Park Operations and Facilities

Both districts of Saguaro National Park have administrative and visitor service facilities and related park operations. Changes in staffing levels, visitor use activities, and management strategies have implications for park operations and facilities. Issues to be addressed in this plan related to park operations and facilities are as follows.

Park Infrastructure. In the face of rapidly increasing visitor use and adjacent land development, there is a need for more park staff to protect resources and manage visitation. Currently, park infrastructure for office space is inadequate to support park staff needs. In addition, increasing visitor use is resulting in more days of overcrowded parking at the visitor centers. Also, the public has expressed concern over the lack of parking to support buses and horse trailers at key trailheads. Many respondents during public scoping also indicated a desire for more support facilities at trailheads, such as shade ramadas, water, and restrooms. The plan needs to consider how best to meet increasing demands for park infrastructure while protecting desired resource and visitor experience conditions. The plan also needs to evaluate opportunities for partnering with other local, regional, and federal organizations to meet park infrastructure needs.

Madrona Facilities —Residential development near the Madrona area could result in increased access to the site, which adjoins a very sensitive riparian area. The Arizona State Trail may pass through the park somewhere near Madrona. Facilities at the site were closed due to health risks associated with the park's pack stock, lead-based paint concerns, hanta virus issues, and insect problems. During public scoping, there were many comments related to reopening Madrona for public access to some degree. Some respondents even wanted vehicle access to the site. Because the complexity of park operations at Madrona may increase with increased public access, the plan needs to reevaluate the activities, facilities, and resource protection measures needed at the site.

Manning Camp — The use of Manning Camp for fire and other management activities is affecting wilderness and natural resource values in the area. In addition, the use of the site for park operations is also a concern for protecting the historic structure and landscape. The plan needs to evaluate the impacts of these uses and explore alternative sites for the uses considered.

Trail System — Most respondents to public scoping commented on the park's trail system. Many people wanted more trails for particular types of activities (e.g., bicycle and horseback riding). Other people wanted fewer trails for the same activities. Most people wanted the trail system to remain as it is now, with no additions or closures. Some of the public suggested that a few of the trails should be designated for only one type of recreational use, otherwise known as "single-use trails." Many suggested that the trail system should be diverse in terms of terrain, scenery, and challenge. Also, loop trails were considered most

desirable by many of the recreation groups. The park's trail network needs to be designed to limit impacts from erosion, invasion of nonnative species, sedimentation of water features, and visitor use conflicts. The appropriate density, type, and use levels of trails called for in the alternatives, as well as for the overall trail system, will be addressed in the ongoing comprehensive trails plan.

Regional Trail Connections. There is strong interest by local governments and the public to increase regional trail connections to both districts of the park. Recreation users would like to access the park via trails to eliminate the need to drive to the park. Recreation users would also like to use trails in the park as a connection to trail opportunities on adjacent public lands. The Arizona State Trail Association would like to connect to the Rincon Mountain District, through the expansion area on the southern boundary. The plan needs to address the possibility of providing additional regional trail connections to the park, particularly the appropriateness of the proposed alignment for the Arizona State Trail.

Partnerships and Community Involvement. There is a great deal of interest by park neighbors and the general public related to planning and management efforts of the park. The plan needs to facilitate continuing dialogue with the local and regional community to support park management efforts. Also, the plan needs to consider opportunities to partner with Pima County, other local governments, tribes, and various nonprofit groups to develop strategies to protect and manage park resources and provide high-quality visitor experiences. Some of the partnership opportunities may include fire management, wildlife corridor protection, and trail opportunities and maintenance.

Boundary Modifications. Congress directed the Park Service to consider the need for potential boundary modifications in the development of general management plans. In Saguaro National Park, expanding population and residential growth is increasing along the park boundary. This is causing a substantial increase in habitat fragmentation and isolation of park habitat. Park resources are being affected by increased traffic, pollution, trash, and illegal activities. Protecting wildlife corridors and habitat is a fundamental resource for the park.

While adding lands to the park and having them acquired by the Park Service is only one of many ways to accomplish goals (see appendix B, boundary adjustments table), the plan needs to consider whether additional lands are needed to protect park resources.

ISSUES AND CONCERNS NOT ADDRESSED IN THE GENERAL MANAGEMENT PLAN

Not all of the issues or concerns raised by the public are included in this general management plan. Other issues raised by the public were not considered because they

- are already prescribed by law, regulation, or policy (see the "Servicewide Mandates and Policies" section),
- would be in violation of laws, regulations, or policies, and/or
- were at a level that was too detailed for a general management plan and are more appropriately addressed in subsequent planning documents.

This section briefly describes each of these issues, and the basis for excluding them from this general management plan.

Some members of the public requested automobile access to Manning Camp. The Wilderness Act does not permit vehicles in designated wilderness.

Some suggested vehicle access to Madrona, but this would be a violation of the deeded right-of-way on private property.

Some members of the public requested additional water catchments for wildlife to improve wildlife viewing opportunities. Although the park has some of these water catchments, changes in NPS policies now prohibit adding new catchments.

Other requests were to eliminate/increase entrance fees. This issue is addressed at the national level and is not in the park's control.

Requests also were made for bus service or other modes of transportation to the park in addition to private vehicles. Because the park is close to a major urban area with a public transit system, it is logical to consider using some of the city's transportation system to help ease the park's parking problems and improve visitor access options. If transit to the park is considered, it would be necessary to consider planning for trail opportunities leaving from the park's visitor centers. Some respondents also suggested closing the park roads to vehicles and providing shuttle/tram opportunities on existing park roads. Any future plans for public transit would be developed in conjunction with local transit authorities.

IMPACT TOPICS — RESOURCES AND VALUES AT STAKE IN THE PLANNING PROCESS

IMPACT TOPICS

An important part of planning is seeking to understand the consequences of making one decision over another. To this end, NPS general management plans are typically accompanied by full environmental impact statements. Environmental impact statements identify the anticipated impacts of possible actions on resources and on park visitors and neighbors. Impacts are organized by topic, such as "impacts on the visitor experience" or "impacts on vegetation and soils." Impact topics serve to focus the environmental analysis and to ensure the relevance of impact evaluation. The impact topics identified for this general management plan are outlined in this section; they were identified based on federal laws and other legal requirements, Council on Environmental Quality guidelines, NPS management policies, staff subject-matter expertise, and issues and concerns expressed by the public and other agencies early in the planning process (see previous section). Also included is a discussion of some impact topics that are commonly addressed, but that are not addressed in this plan for the reasons given.

IMPACT TOPICS TO BE CONSIDERED

Natural Resources

A major reason for establishing Saguaro National Park was to protect its natural resources and its abundant natural scenery. Natural resources in Saguaro National Park are particularly valuable because the park protects increasingly rare examples of the nation's natural heritage.

Vegetation. The establishing legislation for Saguaro National Park identifies "prime Sonoran desert habitat including exceptionally rich area of saguaro cactus and palo-verde uplands" as essential resources of the park. The National Park Service interprets this in an ecological context to mean not individual cacti but the interrelated plants and animals that make up the Sonoran desert vegetative community. Dense stands of Saguaro and other cacti are an essential component of the scenic quality of the park that is mentioned in the establishing legislation.

The statements of park significance include several references to the saguaro cacti and associated vegetation's contribution to the park's character. The vegetation is an essential component of the landscape and scenic qualities of the park, and this vegetation provides protected habitat for wildlife and plant species. During scoping, many comments were received about the value of the park for protecting the flora of the Sonoran Desert and for providing an intimate look at this diverse desert ecosystem. Some of the actions proposed in the alternatives could affect vegetation. Therefore, this topic will be analyzed in detail.

Wildlife. The Organic Act and NPS *Management Policies2006* both require the National Park Service to protect and conserve native wildlife populations that could be affected by visitors, managers, and external sources. Changes in wildlife habitat or in wildlife populations due to implementation of the alternatives would be of concern to visitors, the public, and park managers.

The opportunity to support important wildlife corridors is particularly important to the management of Saguaro National Park.

The park is adjacent to several existing or potential public land corridors that can provide wildlife habitat for an array of native fauna. In addition, increasing urbanization is reducing the number and size of wildlife corridors in the region. Therefore, park management considers protection of wildlife corridors as one of the fundamental values of the park. During scoping, many comments were received about the need to further protect corridors that extend north and south from both the Tucson and Rincon Mountains.

Some of the actions proposed in the alternatives could affect wildlife. Therefore, this topic will be analyzed in detail.

Threatened and Endangered Species and Species of Concern. The protection of species of special concern and their habitats is mandated by the Endangered Species Act and NPS *Management Policies 2006*. Saguaro National Park provides habitat for several threatened and endangered species, as well as 14 species considered vulnerable in the *Sonoran Desert Conservation Plan* developed by Pima County. Some of the actions proposed in the alternatives could affect species of special concern. Therefore, this topic will be analyzed in detail.

Soils/Geologic Resources. The protection of soils and natural processes is mandated by the Organic Act and NPS *Management Policies 2006*. Some soils within Saguaro National Park are susceptible to wind and water erosion and compaction. Maintaining productive soil qualities while allowing for visitor use is an issue. The policy states that the Park Service will actively seek to understand and preserve the soil resources, and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil, or its contamination of other resources.

Some of the actions proposed in the alternatives could affect park soils. Therefore, this topic will be analyzed in detail.

Soundscapes. NPS *Management Policies 2006* and Director's Order 47, "Soundscape Preservation and Noise Management," recognize that natural soundscapes are a park resource and call for the National Park Service to preserve, to the greatest extent possible, the natural soundscapes of parks. The policies and director's order further state that the Park Service will restore to the natural conditions whenever possible those park soundscapes that have become degraded by unnatural sounds (noise), and will protect natural soundscapes from unacceptable impacts.

Saguaro National Park's natural soundscape (sometimes called natural quiet) is one of the resources that make this park a special place. The park's purpose statements include the importance of protecting natural quiet in the park, especially in the wilderness areas. Noise can adversely affect, directly and indirectly, the natural soundscape and other park resources. It can also adversely impact the visitor experience. Currently, park visitors have some opportunities to experience solitude and tranquility in an environment of natural sounds, especially in the areas of the park that are designated wilderness. Many comments received during scoping specifically mentioned opportunities to experience natural quiet and related perceptions of solitude, tranquility, and peace as some of the most important values of the park. Some of the actions proposed in the alternatives could affect the park's soundscapes. Therefore, this topic will be analyzed in detail.

Cultural Resources

Archeological Resources. Archeological resources is retained as an impact topic because ground disturbance associated with proposed development actions, such as for new or expanded trails or other facilities,

could disturb currently unidentified archeological resources. This topic is also retained for further analysis as an impact topic because of potential impacts associated with new construction and potential impacts associated with increased visitation as more people use the park. Law, regulation, or policy sources relevant to the impacts analysis of archeological resources are Section 106 of the National Historic Preservation Act as amended; Director's Order 28*; Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation, Effective September 29, 1983, as Amended*; NPS *Management Policies 2006;* and the National Environmental Policy Act as amended.

Cultural Landscapes. Cultural landscapes is retained as an impact topic because changes associated with proposed development actions could affect landscape features or patterns of national-register-eligible cultural landscapes of the potential cultural landscapes mentioned in chapter 3 under "Cultural Resources." A strategy for inventorying and treating the potential cultural landscapes listed needs to be developed. Law, regulation, or policy sources relevant to the impacts analysis of cultural landscapes are Section 106 of the National Historic Preservation Act of 1966 as amended; Director's Order 28*; Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes, Effective August 11, 1995*; NPS *Management Policies 2006;* and the National Environmental Policy Act of 1969 as amended.

Ethnographic Resources. Ethnographic resources is retained as an impact topic because the continuing the high-speed/high noise traffic conditions on Sandario and Kinney roads would continue associated with proposed development actions would affect the traditional use area for harvesting saguaro fruit. Law, regulation, or policy sources relevant to the impacts analysis of ethnographic resources are Section 106 of the National Historic Preservation Act of 1966 as amended; Director's Order 28*;* Executive Order 13007 on Sacred Sites; NPS *Management Policies 2006*; and implementing regulations of the Council on Environmental Quality for the National Environmental Policy Act of 1969 as amended.

Historic Structures. Historic structures is retained as an impact topic because changes associated with proposed development actions would affect historic structures such as the Civilian Aeronautical Administration building, Manning Cabin at Manning Camp, and Cactus Forest Drive. Law, regulation, or policy sources relevant to the impacts analysis of archeological resources are Section 106 of the National Historic Preservation Act of 1966 as amended; Director's Order 28*; Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings*, 1995; NPS *Management Policies 2006;* and the National Environmental Policy Act of 1969 as amended.

Visitor Use and Experience

A part of Saguaro National Park's purpose is to provide opportunities to understand and enjoy the park's resources in a manner that is compatible with the preservation of park resources and wilderness character. The park is highly valued by its visitors for the opportunities to recreate in and learn about the beautiful and diverse Sonoran Desert ecosystem and associated mountains.

Range of Recreational Opportunities. The park provides a diverse array of recreational opportunities in a spectacular setting that is highly valued by local, national, and international visitors. During scoping, most respondents acknowledged their enjoyment of the park's recreational opportunities and suggested that the amount of opportunities should be maintained at current levels.

Specific amenities requested to enhance recreational opportunities included shade ramadas and water at trailheads, loop trails, single-use trails, and trails covering varied terrain. Some of the public expressed a concern that the park may close trails in the future, which would reduce opportunities for visitors. Also during scoping, some mentioned the need for increased opportunities for bicyclists, especially to provide connections to regional trails on other public lands adjacent to the park. Some mentioned the need to reduce use of the park by bicyclists and horseback riders, citing concern over user conflicts and potential resource impacts, particularly from horseback riders on high elevation trails. Finally, there was some concern over the amount of automobile traffic on roads passing through the park, which impacts scenic driving opportunities as well as poses risks to visitor safety. The amount and type of recreational opportunities proposed in the alternatives will be a topic of high interest to the local and regional public.

Opportunities for Solitude and Getting in Touch with Nature. Some of the fundamental values of the visitor experience at Saguaro National Park are the opportunities for solitude and getting in touch with the beauty and naturalness of the Sonoran Desert. The values of the park to visitors mentioned most often during scoping were quiet, solitude, getting away from the urban environment, and seclusion. The park has restorative value to people as a place of natural beauty and decompression from day-to-day urban living.

Visitor Access, including Access for Visitors with Disabilities. Visitor access in Saguaro National Park needs to be managed to meet the desired resource conditions and visitor experiences that have already been outlined. During scoping, some respondents expressed concerns over high levels of use and access to certain portions of the park's wilderness. There was some discussion about increasing access from non-designated locations along the park's boundary by neighbors to the park that may damage resources and increase conflicts between recreationists. In contrast, a number of respondents during the scoping process stated that the park needs additional access points, especially in some of the park's expansion areas, to provide much-needed access to underserved portions of the park. One of the topics of most interest to the park's partners and the public was the connection of regional trail opportunities to the park boundaries, providing travel routes through the park to other public lands. Locations for access to the park proposed in the alternatives will be a topic of high interest to the local and regional public.

The Architectural Barriers Act and the Architectural Barriers Act Accessibility Standards (2006) and NPS *Management Policies 2006* require the National Park Service to design, construct, and operate all buildings and facilities so that they are accessible to, and usable by, persons with disabilities to the greatest extent reasonable. During scoping, several members of the public expressed a desire to have more accessible nature trails in Saguaro National Park.

Regional Recreational Opportunities (outside and connecting to the Park). There are many public lands in the region providing many of the same types of recreational opportunities as Saguaro National Park. During scoping with the park's partners, there was much discussion about the need to coordinate planning with other public land managers to ensure that the regional supply and demand for recreation opportunities was satisfied and appropriately located. One of the topics of most interest to the park's partners and the public was the connection of regional trail opportunities to the park boundaries that provide travel routes through the park to other public lands.

Opportunities for Orientation, Education and Interpretation. Some of the fundamental values of the park identified by park management are educating people for close interaction with the environment, including opportunities for discovery. The public identified the need for more guided and scheduled programs to enhance educational opportunities. The public also identified an interest in additional interpretation of the park's cultural resources.

Visitor Safety. Visitor safety is a paramount concern of park management to ensure high-quality visitor experiences. There are a couple of current visitor safety concerns in Saguaro. The amount and speed of automobile traffic on roads passing through the park create unsafe conditions for visitors, especially during peak hours of the day that correspond with commuter traffic. In addition to actual safety conflicts, there is a high level of perceived safety conflicts on the through-park roads due to the current traffic conditions. Another visitor safety topic of interest includes safety information dissemination regarding visitor use of the park at the visitor centers. The occasional crowding at the Rincon Mountain District visitor center may constrain adequate dissemination of safety information.

Socioeconomic Environment

The National Environmental Policy Act requires evaluation of the impacts of federal actions on the social and economic environment. The general management plan alternatives could affect the social and economic environment and opportunities of residents and businesses in the park vicinity through potential changes in park management, operations, and visitor use and experience. In addition, impacts on the socioeconomic environment resulting from the general management plan alternatives would contribute incrementally to the impacts of other past, present, and foreseeable future actions in the Tucson area, resulting in cumulative impacts. Consequently, socioeconomic environment is retained as an impact topic and analyzed in this document.

Transportation

Local and regional transportation was identified as an impact topic. Issues of visitor safety and circulation through the national park are of paramount concern. As noted above, many park roads could benefit from safety improvements for visitors or commuters and are heavily impacting wildlife due to high volumes of traffic and speeds. The amount and speed of automobile traffic on roads passing through the park create unsafe conditions for visitors, especially during peak hours of the day that correspond with commuter traffic. In addition to actual safety conflicts, there is a high level of perceived safety conflicts on the through-park roads due to the current traffic conditions. During public scoping the public suggested that the Park Service consider the possibility of closing some park roads. Therefore this topic will be analyzed further.

Park Operations

The alternatives proposed in this plan could affect park operations and facilities in the national park. Topics include staffing, maintenance, facilities, emergency response time, ability to enforce park regulations and protect park values, employee and visitor health and safety, and management of other resources.

IMPACT TOPICS DISMISSED FROM FURTHER CONSIDERATION

Some impact topics that commonly are considered during the planning process were not relevant to the development of this general management plan for Saguaro

National Park due to the following: (a) implementing the alternatives would have no effect, a negligible effect, or a minor effect on the topic or resource or (b) the resource does not occur in the national park. These topics are as follows.

Natural Resources

Air Quality. Under the 1963 Clean Air Act, as amended (42 USC 7401 et seq.), the federal land manager has a responsibility to protect the park's air-quality-related values (including visibility, plants, animals, soils, water quality, and cultural resources) from adverse air pollution impacts. Section 118 of the act requires the park to meet all federal, state, and local air pollution standards. Section 176(c) of the act requires all federal activities and projects to conform to state air quality implementation plans to attain and maintain national ambient air quality standards. NPS *Management Policies 2006* addresses the need to analyze potential impacts on air quality during park planning.

By virtue of its 1976 wilderness designation, Saguaro National Park is officially designated a Class I airshed under the Clean Air Act Amendments of 1977. This most stringent air quality classification is aimed at protecting national parks and wilderness areas from air quality degradation. Saguaro National Park is in the Sonoran Desert. Air quality issues of concern in the Sonoran Desert include nitrogen deposition effects, ozone injury to vegetation, and visibility impairment from fine particle haze.

Atmospheric deposition is the process by which airborne pollutants are deposited to the earth. These pollutants include, but are not limited to, sulfur dioxide, nitrogen oxides, ammonia, and mercury. Total deposition consists of both wet and dry components. Due to its desert location, nitrogen deposition is the primary concern at the park. Surface waters in the park are generally well-buffered; therefore, surface waters are not likely to be acidified by atmospheric deposition of nitrogen and sulfur compounds. Most soils are also likely to be well-buffered from acidification. However, there may be areas in the park where rock is resistant to weathering and soils and water (e.g., in potholes) may be sensitive to acidic deposition.

A concern exists that soils and vegetation in the park may be sensitive to nutrient enrichment from nitrogen deposition. The risk is that native plants that evolved under nitrogen-poor conditions would be replaced by invasive species that are able to take advantage of increased nitrogen levels. Estimates of total nitrogen and sulfur deposition can be made by adding wet and dry deposition. Deposition is not monitored in Saguaro National Park. However, the NPS Air Resources Division has estimated deposition of sulfur and nitrogen in the park using interpolation techniques on data from deposition monitors throughout the Southwest. Although the estimates of deposition are relatively low, they are elevated above natural conditions.

Several plant species that occur in the park are known to be sensitive to ozone, including ponderosa pine *(Pinus ponderosa*), quaking aspen *(Populus tremuloides)*, and skunkbush (*Rhus trilobata*). Tropospheric (ground-level) ozone concentrations have been monitored from 1982 to the present day. In 2002 the highest daily maximum 8-hour average was 82 parts per billion (ppb); the national standard for the high daily maximum 8-hour average is 85 ppb, based on the fourth highest average. If ozone concentrations increase, the area may be in violation of the national standard. In addition, cumulative ozone doses over the growing season are within a range that can produce visible effects or growth effects on sensitive plant species under certain conditions. Vegetation surveys in the late

1980s found symptoms of ozone injury on ponderosa pine.

Saguaro National Park is taking measures to monitor visibility. A monitoring station has been monitoring air quality in the eastern district of Saguaro since 1998. A monitor has been installed in the western district since 2001. The data collected from these monitors show that visibility at Saguaro has been held constant with some slight improvements. Information collected from additional monitors show that ozone levels at Saguaro are also remaining constant and even improving slightly.

Preventing deterioration of air quality in the park faces the practical considerations that result from adjoining the Tucson metropolitan area, which substantially impacts air quality throughout the Tucson Basin. Both local and distant air pollution sources affect air quality in the park. Power plants and other industrial sources in Pima, Pinal, and Cochise counties in Arizona; Hidalgo County in New Mexico; and mobile and area sources in the Tucson and Phoenix metropolitan areas all contribute pollutants to the park. In addition, pollutants from power plants, smelters, and other sources in Mexico affect the park, as does the long-range transport of pollutants from other areas.

Under alternative 1, the no-action alternative, management of the park would continue to use existing approaches to air quality issues. Access and road circulation would be anticipated to remain essentially the same as at present. Consequently, air quality in the park would be expected to be very similar to the present, varying primarily with metropolitan and regional growth over the life of the plan. Predicted increases in visitation over the life of the plan would likely increase traffic and associated emissions on a localized level, resulting in minor long-term adverse impacts to local air quality. However, in the context of the overall metropolitan airshed, the impact to air quality from increased visitation over the life of the plan under alternative 1 would be negligible.

Other past, present, and reasonably foreseeable future projects would have potential impacts on air quality in the park. As described in the introduction to "Chapter 4, Environmental Consequences," these other actions range from projects within the park, such as rehabilitation of Cactus Forest Drive and the comprehensive trails plan, to actions by others outside the park, such the proposed Twin Peaks interchange. Although the no-action alternative would contribute to the overall long-term moderate adverse impacts from these other past, present, and reasonably foreseeable future actions in the airshed, the added increment of this alternative would be very slight relative to the overall cumulative impact.

Alternatives 2 and 3 may have a reduction in air pollution in localized areas due to traffic-calming devices slowing traffic. This would be a long-term, localized improvement on air quality. Construction and improvement projects could pose a short-term, localized, negligible adverse impact on air quality, principally from dust created during demolition/construction and heavy equipment operation. Specific mitigative measures to control dust and other air pollutants would be addressed as a part of each project's specific compliance.

Overall, there would be slight and temporary degradation of local air quality due to the use of construction equipment in the park, such as construction equipment emissions and dust. This effect would last only as long as the particular construction activity, and the park's Class I air quality would not be affected by the proposal. Impacts would be negligible and short term. The proposed actions would not have any impacts on the rate of nitrogen deposition or ozone concentrations in the park or surrounding

communities. The conversion of Golden Gate Road to a trail would be expected to reduce dust released into the atmosphere. No long-term adverse impacts on air-quality-related values are expected to occur from implementing the management plan action alternatives. Therefore, because neither alternative 2 nor 3 would contribute new long-term adverse impacts to the area's air quality, these alternatives would have no long-term cumulative impacts on this resource.

The park would continue to work with partners to minimize impacts on the airshed due to activities outside the park's boundary. The park, with the help of partners, would strive to improve the visibility within the park so that it is representative of the natural visibility that existed when the Clean Air Act amendments passed in 1977.

Saguaro National Park acknowledges that air quality is a critical resource to protect. The park is committed to doing what it can to ensure that air quality at Saguaro is not degraded, mainly by implementing the measures mentioned above. However, as previously noted, the actions that are authorized by the management plan alternatives are expected to have only a negligible adverse impact on air quality; therefore, air quality is dismissed as an impact topic.

Floodplains. Executive Order 11988, "Floodplain Management," requires an examination of impacts on floodplains and potential risk involved in placing facilities within floodplains. NPS management policies; Director's Order #2: Planning Guidelines; and Director's Order #12: Conservation Planning, Environmental Impact Analysis, and Decision-making provide guidelines for proposed actions in floodplains. Most of Saguaro is considered Zone D (areas in which flood hazards are undetermined) on the FEMA Flood Insurance Rate Maps (FIRM). A few areas are in Zone X (areas determined to be outside the 500-year floodplain) on the insurance rate maps. The park does have some floodplains identified on the maps. They are near the park's borders along large creeks such as Rincon Creek. None of the proposed actions are located in a known floodplain. Upon consultation with an NPS regional hydrologist, it was determined that the proposed actions will not have any impacts on the floodplains or the functioning of the floodplains. The proposed actions would not change the ability of a floodplain to convey floodwaters or its values and functions, nor would the proposed actions contribute to a flood; therefore this topic will not be analyzed further.

Wetlands. Executive Order 11990, "Protection of Wetlands," requires an examination of impacts on wetlands. An official wetlands delineation has not been completed according to US Army Corps of Engineers protocols; however, mapping has been completed by the U.S. Fish and Wildlife Service as part of the *National Wetlands Inventory*. Although the NWI maps do not show any wetlands within the park, some seeps and springs are known to occur. However, any projects proposed in the alternatives would undergo site-specific compliance that would evaluate any potential impacts on wetlands; therefore, this impact topic will not be analyzed further.

Invasive Exotic Plants. Saguaro National Park has about 1,200 plant species, of which 80 are nonnative. Of the nonnative plant species, approximately 17 are considered invasive. A few of the invasive exotic plants that are of concern include buffelgrass *(Pennisetum ciliare)*, fountain grass *(Pennisetum setaceum)*, red brome *(Bromus rubens)*, Lehmann lovegrass *(Eragrostis Lehmanniana)*, Russian thistle *(Salsola iberica)*, tamarisk *(Tamarix* sp.*)*, malta starthistle *(Centaurea melitensis)*, and Sahara mustard *(Brassica tournefortii)*. Several of these species have seeds that are dispersed

by wind. However, many infestations begin along washes, trails, and roads. Water is a major transporter of seeds to new locations where infestations then become established. Visitors and staff also can transport exotics on their shoes or their vehicles. The seeds may be left behind along trails and roads. In the alternatives, all of the proposed actions would be in or near currently developed areas. Erosion control during construction projects would minimize the transport of seeds to areas outside of the construction footprint. An exotic plant control program would be implemented during construction to minimize the spread of noxious weeds. Saguaro National Park has an active control program for exotic plant management, which will be used to address any control measures needed to remove exotic plants that may be introduced. The adverse impacts from the introduction of exotic plants as a result of actions proposed in this plan would be negligible. Therefore, this impact topic will not be analyzed further.

Prime and Unique Farmlands. In August 1980, the Council on Environmental Quality directed that federal agencies must assess the effects of their actions on farmland soils classified by the U.S. Department of Agriculture's Natural Resources Conservation Service as prime or unique. Prime or unique farmland is defined as soil that particularly produces general crops such as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables, and nuts. According to the Natural Resources Conservation Service, (USDA 2002), the park does not have soils that are classified as prime and unique farmlands. A soil type that can be considered prime farmland is found within the Rincon Mountain District; however, the Anthony fine sandy loam soil type is required to be irrigated and either protected from flooding or not frequently flooded during the growing season. The park does not have any irrigated land within the park boundaries. Therefore, the topic of prime and unique farmlands was dismissed as an impact topic in this document.

Natural Lightscapes. In accordance with NPS *Management Policies 2006*, the National Park Service will preserve, to the extent possible, natural lightscapes of parks, which are natural resources and values that exist in the absence of human-caused light. The proposed actions would be limited in location and time. The projects would be located in existing developed areas and would not have an appreciable change on the existing development footprint. Only the Rincon Mountain District visitor center is proposed to be expanded from its current footprint. The visitor center closes in the early evening so outdoor lighting needs would be minimal. The proposed activities would have a negligible adverse impact on natural lightscapes because work would be short term in duration with minimal activities occurring after dusk. Any new lighting installed would follow the guidance set forth in Section 4.10 of the NPS management policies. Therefore, natural lightscape was dismissed as an impact topic in this document.

Water Quantity. Watersheds in Saguaro National Park are generally small with first-, second-, and third-order drainages (Mott 1997). In the Tucson Mountain District these drainages are strictly ephemeral, flowing primarily in response to summer "monsoon" storms that bring brief but substantial precipitation. Unlike the summer storms that commonly lead to flash flooding, winter precipitation tends to be gentler and longer in duration; this rainfall better infiltrates the soil with minimal surface flow. The Tucson Mountain District receives about 11.8 inches of precipitation annually, fairly equally divided between winter and summer. No perennial water or wetlands per NWI mapping) are present in the district, although a few small natural intermittent seeps occur near King Canyon. Additionally, three windmills provide supplemental water for wildlife, drawing water from wells into

man-made catchments. Two of these are maintained to mitigate the loss of wildlife access to water sources along Brawley Wash, which was isolated from the Tucson District by the Central Arizona Project canal. It is unclear the historic reason for the construction of the third windmill, but it is thought to have been built for livestock or wildlife mitigation on the east side of the Tucson Mountains.

The Rincon Mountain District has much higher elevation watersheds than the Tucson Mountain District, reaching over 8,000 feet compared to the Tucson Mountain District, whose highest peak is 4,687 feet. Consequently, larger amounts of precipitation are collected at the Rincon Mountain District. Annual rainfall in the lower elevations, like the Tucson Mountain District, averages 11 inches, but annual precipitation near Mica Mountain (elevation 8,666 ft) can exceed 30 inches, and the snow pack can be heavy in the winter. In average years, snowmelt in winter and spring leads to most of the annual surface flow. Summer conditions are similar to the Tucson Mountain District, where surface flow occurs exclusively after large storms. Streams are perennially interrupted, intermittent, or ephemeral, but pools of water often remain year round. Several springs and seeps occur throughout the upper elevations.

Actions outside the park could affect the park's water quantity. The park is in an arid climate with limited annual rainfall. Continued expansion of residential development along the park's borders could draw down the water table in the park because new houses typically have individual wells for their water supply. No new wells in the park are proposed in any of the alternatives, which means the rate of groundwater level depletion would not increase as a result of park actions. Erosion control methods would be used during ground-disturbing construction, which will minimize the amount of sediment that reaches creeks and pools. Based on consultations with the NPS Water Resources Division, the proposed alternatives would have negligible adverse impacts on the park's water quantity. Therefore, this impact is not further evaluated in this document.

Wilderness. Much of the land in Saguaro National Park (71,400 acres) has been formally designated as wilderness in accordance with the provisions of the Wilderness Act. In wilderness areas, the park seeks to provide outstanding opportunities for solitude or a primitive and unconfined type of recreation, and the opportunity for connection with nature. In addition to an absence of human-produced structures and roads, wilderness is also defined by its natural scenery, natural quiet, and solitude.

A wilderness suitability assessment was completed on lands added to the park since 1976, the last designation of wilderness within the park (see appendix F). The lands considered potentially suitable will be formally evaluated as part of a future wilderness study. The lands designated for wilderness and assessed as potentially suitable have been zoned as primitive or semi-primitive in the two action alternatives. This zoning would ensure that wilderness qualities are maintained until the wilderness study is completed on the lands found suitable.

Under the no-action alternative the park would manage those lands found suitable as wilderness, which will protect their wilderness qualities. Therefore, in all alternatives, lands assessed as suitable are protected. The alternatives would have a negligible adverse impact on wilderness. Thus, this topic will not be evaluated further in this document.

Indian Trust Resources

Secretarial Order 3175 issued by Secretary of the Interior Bruce Babbitt, November 8, 1993, requires that impacts on Indian trust

resources from a proposed project or action by United States Department of the Interior agencies be addressed in environmental documents.

This order was reinforced by President William Clinton's April 29, 1994, memorandum to the heads of executive departments and agencies directing that tribal trust resources be considered during the development of federal plans, projects, programs, and activities.

The federal Indian trust responsibility is the fiduciary duty of the federal government emanating from treaties and statutes to protect Indian lands, resources, assets, and rights and to carry out the mandates of federal law concerning American Indian and Alaska Native tribes.

NPS staff at Saguaro National Park recognize the historic and cultural use of part of the park for traditional Tohono O'odham harvesting of the fruit of saguaro cacti by special permit. But such recognition and permitting does not translate into the creation of a trust resource because the harvesting is to take place in the context of first preserving and managing saguaro cacti for the benefit of all Americans as required by the Organic Act and subsequent legislation.

Indian trust resources is not analyzed as an impact topic in this document because the resources of Saguaro National Park are preserved and managed for the benefit of all Americans, as are other units of the national park system. This management mandate stems from the Organic Act of August 25, 1916, establishing the National Park Service; from President Herbert Hoover's executive proclamation of March 1, 1933, establishing Saguaro National Monument; from the August 10, 1933, transfer of the national monument by Congress from the Forest Service of the United States Department of Agriculture to the National Park Service of the United States Department of the Interior; and from the redesignation by Congress of the national monument as a national park on October 4, 1994. The planning team has concluded that there are no Indian trust resources at Saguaro National Park. Therefore, the subject is not included as an impact topic.

Museum Collections

Most of the park's museum collection consists of archives that contain records of more than 70 years of park operations. The collection also includes a number of archeological objects that have been recovered during surface surveys or small data recovery projects within the park's boundaries. The collection also includes geological specimens, botanical specimens, faunal specimens, and other biological specimens (insect, reptile, amphibian, bird, and mammal specimens) with associated field records. The total number of objects in the park's collection is about 89,780 items. The archives and archeological and cultural resource artifacts are housed at the NPS Western Archeological and Conservation Center in Tucson. This represents 95% of the park's museum collections. Three percent of the collection relates to natural history specimens, most of which are also being stored at the Western Archeological and Conservation Center, and less than 2% is in non-NPS repositories at two locations.

Almost all of the park's natural history collection was transferred to the Western Archeological and Conservation Center for storage in 2005. A few bird and mammal specimens are on loan for storage to the University of Arizona ornithology and mammal collections, respectively. About 1,500 lichen specimens are loaned to the University of Minnesota in Minneapolis for storage in a botany collection that focuses on lichens.

The topic of museum collections and archives is dismissed from further consideration because changes involving museum collections and archives under each alternative will comply with the *Museum Collection Facilities Strategy, Intermountain Region* (National Park Service 2005d), approved and signed by the NPS regional director on June 16, 2005. The plan is for any cultural history collections remaining in Saguaro National Park to be moved to the NPS Western Archeological and Conservation Center in Tucson where the bulk of the park's cultural history collections are now housed. The park's natural history collections that are on loan to the University of Arizona and to the University of Minnesota would remain on loan. The rest of the natural history collections (currently at the Western Archeological and Conservation Center) would eventually likely be moved to a proposed facility on the campus of the Museum of Northern Arizona in Flagstaff, Arizona, a private, nonprofit institution founded in 1928. A new building is being designed that would house collections from several federal agencies, including the National Park Service and Saguaro National Park, under state-of-the-art museum conditions. The rationale for relocating both the natural history and cultural history collections, including the archives, away from the park to different more centralized locations, is to provide curation, storage, and research conditions that meet museum standards under the staffing of professional curators.

The concentration and centralization of both the park's cultural history collections, including archives, and natural history collections, albeit in different locations, would be beneficial to museum collections and archives, and of long-term duration, because of the greater prevalence of curation and storage conditions meeting museum standards and because of the cultural, historical, and scientific soundness resulting from the increased ease of comparison with related collections. Therefore, the topic of museum collections and archives will not be analyzed further in this document.

Environmental Justice

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires that each federal agency make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. This executive order also requires that public participation efforts be inclusive of potentially affected minority and low-income populations.

A screening-level analysis was conducted to determine the existence of a low-income and/or minority population within the area of potential effect for the *Saguaro National Park General Management Plan / Environmental Impact Statement.* This analysis followed the guidance of the Environmental Protection Agency's *Environmental Justice Guidance* (1998) and the Council on Environmental Quality *Environmental Justice Guidance under the National Environmental Policy Act* (1997). For purposes of this analysis, minorities and low-income persons and populations are defined as follows:

- Minorities are persons of Hispanic or Latino origin of any race, Blacks, American Indian/Alaska Natives, and Asians or Pacific Islanders (without double-counting persons of Hispanic/Latino origin who also are contained in the racial groups).
- Low-income represents persons living below the poverty level. The U.S. Census Bureau uses a set of income thresholds that vary by family size and composition

to determine who is poor. Based on this, the poverty level for a family of four in 2002 having two children under the age of 18 was $18,244 (U.S. Census Bureau 2003c). The Census 2000 data, however, is based on 1999 data, when the poverty level for the same family was $16,895 (U.S. Census Bureau 2002a).

- Minority and low-income populations are identified as those that have a 50% or greater minority or low-income population, respective, or if the populations have a greater proportion of minority/low-income persons as compared to the comparison population.

The presence of environmental justice populations has been evaluated for the communities closest to Saguaro National Park that are most likely to be affected by management decisions made regarding these lands. These communities include the City of Tucson, the town of Marana, Census Tract 44.09 (which represents the Avra Valley area adjacent to the Tucson Mountain District) and Census Tract 40.61 (the area around and including the Rincon Mountain District. Data for the county and state levels provide comparison populations to determine whether minority and/or low-income populations within the communities near Saguaro National Park have a greater proportion of minorities and/or low-income persons. Table 2 summarizes the minority and low-income groups identified in this analysis.

The total minority population as listed in table 2 includes individuals who have identified themselves in any race or combination of races other than White. The comparison minority population (Arizona) was 36.2% in 1999. Poverty rates listed in Table 2 are also based on the state of Arizona's low-income population average of 13.9% in 1999. Based on these values, only Pima County and Tucson have populations that exceed the minority and low-income thresholds. The remaining communities surrounding Saguaro National Park all fall well below these thresholds.

To fulfill Executive Order 12898 in the context of the National Environmental Policy Act, the alternatives presented in this

TABLE 2. MINORITY AND LOW-INCOME POPULATIONS (1999)

Arizona (Comparison Population)	Minority Population = 36.2%			Low-income Population =13.9%		
		Minority Population			Low-income Population	
Geographic Area	Total Minority[1]	>50%	>36.2%	Poverty Rate[2]	Poverty Rate >50 %	Poverty Rate >13.9%
Pima County	38.5%	No	Yes	14.7%	No	Yes
City of Tucson	45.8%	No	Yes	18.4%	No	Yes
Town of Marana	28.3%	No	No	6.2%	No	No
Census Tract 44.09	17.8%	No	No	8.1%	No	No
Census Tract 40.16	19.0%	No	No	3.2%	No	No

SOURCE: U.S. Census Bureau 2000a, c

NOTES: [1] The total minority population includes individuals of Hispanic/Latino origin, but those that are also Black/African Americans, American Indian/Alaska Natives, Asians, and Native Hawaiian/other Pacific Islanders are not included in the total in order to avoid double counting.

[2] Poverty rate among individuals, based on poverty status in 1999.

management plan were assessed. Based on this review, it has been determined that none of the proposed alternatives would result in major direct or indirect negative or disproportionately adverse effects on any minority or low-income population or community. Therefore, the topic of environmental justice was dismissed as an impact topic in this document.

The following information contributed to the dismissal of environmental justice as an impact topic:

- The developments and actions of the alternatives would not result in any identifiable adverse human health effects. Therefore, there would be no direct or indirect negative or adverse health effects on any minority or low-income population or community.
- Impacts on the socioeconomic environment due to the proposed action and alternatives would be minor or positive and would occur mostly within the communities surrounding the park. These impacts would not occur all at one time but would be spread over a number of years, thus dispersing their effects. In addition, the planning team does not expect impacts on the socioeconomic environment to result in major effects on the physical and social structure of the nearby communities.
- The impacts on the natural and physical environment that could occur due to any of the alternatives would not disproportionately adversely affect any minority or low-income population or community.
- No predicted effects would potentially disproportionately affect tribal resources (e.g., treaty-protected resources, cultural resources and/or sacred sites).
- The proposed action and alternatives would not result in any identified effects that would be specific to any minority or low-income community.
- The planning team actively solicited public input as part of the planning process and gave equal consideration to all comments from persons regardless of age, race, income status, or other socioeconomic or demographic factors.

Energy Requirements and Conservation Potential

The action alternatives do not call for major development. The actions call for including a modest expansion of the Rincon Mountain visitor center, replacing or reusing existing structures at the park administration area and Madrona, and removing some infrastructure from the Manning Camp area. Limited amounts of nonrenewable resources would be used for these construction projects, but this expenditure of energy would be short term and include fuel for construction vehicles and materials. The completed structures could increase energy consumption but to a negligible level over existing conditions. The application of traffic-calming devices along park roads would be designed to slow traffic, resulting in a decrease of fuel consumption over existing conditions. The National Park Service would pursue sustainable practices whenever possible in all decisions regarding national park operations and facilities management. There is no major development called for in the alternatives. Whenever possible, the Park Service would use energy conservation technologies and renewable energy sources. Consequently, the alternatives would negligibly affect energy consumption compared to current conditions and this topic is dismissed from further analysis.

Urban Quality and Design of the Built Environment

Consideration of this topic is required by 40 *Code of Federal Regulations* (CFR) 1502.16.

The quality of urban areas is not a concern in this planning project except possibly for the Rincon Mountain District visitor center and parking expansion. Throughout the park, vernacular architecture and park-compatible design would be taken into consideration for new structures built under all of the action alternatives. Emphasis would be placed on designs and materials and colors that blend in and do not detract from the natural and built environment. Therefore, adverse impacts are anticipated to be negligible. No further consideration of this topic is necessary.

2

The Alternatives, Including the Preferred Alternative







The left-hand photo on the front of this page is of Stella Tucker of the Tohono O'odham Nation harvesting saguaro cactus fruit in a traditional use area of the park. The photo was taken by Gary Gaynor on June 24, 2002, and is from the *Tucson Citizen;* it is used with permission.

INTRODUCTION

Many aspects of the desired future condition of Saguaro National Park are defined in the establishing legislation, the national park's purpose and significance statements, and the servicewide mandates and policies that were described earlier. Within these parameters, the National Park Service solicited input from the public, NPS staff, government agencies, tribal officials, and other organizations regarding issues and desired conditions for the national park. Planning team members gathered information about existing visitor use and the condition of the national park's facilities and resources. They considered which areas of the national park attract visitors, and which areas have sensitive resources.

Using the above information the planning team developed a set of management prescriptions and two action alternatives to reflect the range of ideas proposed by the national park staff and the public.

This chapter describes the management zones and the alternatives for managing the national park for the next 25 years. The NPS planning process requires development of action alternatives (alternatives 2 and 3) for comparison with no change in current park management and trends (no-action, alternative 1). The chapter includes tables that summarize the key differences between the alternatives and the key differences in the impacts that are expected from implementing each alternative. (The summary of impacts table is based on the analysis in Chapter 4, "Environmental Consequences.") This chapter also describes mitigative measures that would be used to lessen or avoid impacts, the future studies that would be needed, and the environmentally preferred alternative.

MANAGEMENT ZONES AND ALTERNATIVES

The building blocks for reaching an approved plan for managing a national park system unit are the management zones and the alternatives. All are developed within the scope of the park's purpose, significance, mandates, and legislation.

Management zones are descriptions of desired conditions for park resources and visitor experiences in different areas of the park. Management zones are determined for each national park system unit; however the management zones for one unit will likely not be the same for any other national park system unit (although some might be similar). The management zones identify the widest range of potential appropriate resource conditions, visitor experiences, and facilities for the park that fall within the scope of the park's purpose, significance, and special mandates. Six management zones have been identified for Saguaro National Park (see table 3 later in this chapter). It may help to think of the management zones as the colors an artist has in front of him with which to paint a picture.

The **alternatives** in this general management plan are the different pictures that could be painted with the colors (management zones) available. Each of the action alternatives has an overall management concept and a description of how different areas of the park would be managed. The concept for each alternative gives the artist (or in this case the NPS staff) the idea for what the picture (alternative) is going to look like. For example, perhaps one management zone is called "backcountry" and another zone is called "frontcountry." An alternative whose concept is to keep most of the park in an undeveloped and natural/wild condition would have more of the backcountry zone than the frontcountry zone. Both zones might also be

larger or smaller and in different locations in different alternatives, depending on the overall concept for each alternative.

This *Draft General Management Plan/ Environmental Impact Statement* presents three alternatives, including the National Park Service's preferred alternative, for future management of Saguaro National Park. Alternative 1, the "no-action" alternative that presents a continuation of existing management direction, is included as a baseline for comparing the consequences of implementing each alternative. The other "action" alternatives are alternative 2 (preferred) and alternative 3. The action alternatives present different ways to manage resources and visitor use and improve facilities and infrastructure at Saguaro National Park. The two action alternatives embody the range of what the public and the National Park Service want to see accomplished with regard to natural resource conditions, cultural resource conditions, visitor use and experience, the socioeconomic environment, transportation, and park operations at Saguaro National Park. The National Park Service would continue to follow existing agreements and servicewide mandates, laws, and policies regardless of the alternatives considered in this plan. However, actions or desired conditions not mandated by policy, law, or agreements can differ among the alternatives.

As noted above in the "Guidance for Planning" section, the National Park Service would continue to follow existing agreements and servicewide mandates, laws, and policies regardless of the alternatives considered in this plan. These mandates and policies are not repeated in this chapter (see appendix B). However, other general management plan proposed actions *do* differ among the alternatives. These alternative actions are discussed in this chapter.

To truly understand the implications of an alternative, it is important to interpret the actions proposed in an alternative in the context of the servicewide mandates and policies.

FORMULATION OF THE ALTERNATIVES

The alternatives focus on *what* resource conditions and visitor uses and experiences/ opportunities should be at the national park rather than on details of *how* these conditions and uses/ experiences should be achieved. Thus, the alternatives do not include many details on resource or visitor use management.

More detailed plans or studies will be required before most conditions proposed in the alternatives are achieved. The implementation of any alternative also depends on future funding and staffing and environmental compliance. This plan does not guarantee that that money will be forthcoming. The plan establishes a vision of the future that will guide day-to-day and year-to-year management of the national park, but full implementation could take many years.

IDENTIFICATION OF THE PREFERRED ALTERNATIVE

The alternatives were considered from a number of different perspectives, including comments received on the alternatives newsletter and during public and partner workshops, and a preliminary analysis of potential impacts. With these and other elements in mind, the preferred alternative was chosen by the National Park Service through a process called Choosing by Advantages. Choosing by Advantages, or "CBA," is a logical, trackable, decision-making process that allows evaluation of the relationship between results and costs to identify the alternative with the greatest value in accomplishing NPS functional goals and objectives. Developed for use in the public agency

decision-making environment, CBA focuses on the advantages between alternatives, and determines the importance of those advantages based on the park's purpose and related public interest. In using the CBA process, the National Park Service asks "What are the advantages of each alternative proposed for consideration? How important are these advantages?" and finally "Are those advantages worth their associated cost?"

The topics that the interdisciplinary team used to evaluate the relative advantages between alternatives were as follows:

1. protection of ecological habitats
2. protection of riparian corridors
3. protection of natural soundscapes
4. partnership opportunities for resource management
5. protection of Madrona
6. protection of Manning Camp
7. protection of historic structures and cultural landscapes
8. protection of archeological resources
9. opportunities for solitude;
10. access for visitors
11. range of recreational opportunities
12. interpretation and education services
13. efficiency of administrative operations
14. potential for partnerships

The relationships between the advantages and costs of each alternative were established. This process indicated that alternative 2 scored highest with the greatest number of advantages, and alternative 3 was second. This information was used to combine the best attributes of the initial alternatives into alternative 2, which has become the NPS preferred alternative. This alternative gives the National Park Service the greatest overall benefits for each point listed above for the most reasonable cost.

The following zoning modifications highlight the major differences between the preferred alternative (current alternative 2 in this draft plan) and alternative 2 that was presented in the June 2005 alternatives newsletter.

Rincon Mountain District

- The area within Cactus Forest Loop Drive was changed from the semi-primitive zone to the natural zone to allow for the potential of additional accessible nature trails
- Hope Camp Trail was changed from the semi-primitive zone to the natural zone to allow the potential for bicycling activity.

Tucson Mountain District

- The northwest section of land west of Sandario Road was changed from semi-primitive zone to the natural zone to allow for the potential of interpretative trails and signs to be developed near the CCC camp
- Golden Gate Trail was changed from a primitive zone to a natural zone to allow for the potential for bicycling activity.

WILDERNESS

The Wilderness Act mandates the types of visitor and administrative activities as well as the level and types of facility development permitted in designated wilderness. The maps in appendix F show the designated wilderness boundaries and those lands assessed as suitable for potential wilderness. These boundaries are not repeated on the alternative maps. In all alternatives the designated wilderness is zoned sensitive resource, primitive, or semi-primitive. These zones might also extend outside the designated wilderness.

Please look at the wilderness maps and remember that the park has designated wilderness that must be considered in understanding each of the alternatives in its entirety. The lands added after the 1976 wilderness designation and the assessment of those new expansion lands is contained in appendix F.

TRANSPORTATION AND VISITOR USE STUDY

Many park roads create conditions that are unsafe for visitors and commuters due to high volumes of traffic and speeds. To develop alternative solutions to this issue, the park completed the *Saguaro National Park Transportation and Visitor Use Study* (David Evans and Associates 2006). Data (presented to the public in March 2005) indicates that some park roads have already exceeded the level of service for which they were designed. The park contains two types of road corridors: interior roads such as Golden Gate Road, the scenic Bajada Loop Drive, and Cactus Forest Loop Drive, and through-park roads such as Picture Rocks Road and Sandario Road. The alternatives in this document call for converting some interior park roads to trails as well as implementing traffic-calming techniques recommended by the transportation study. The traffic calming will be implemented through a method called "adaptive management" (see next section).

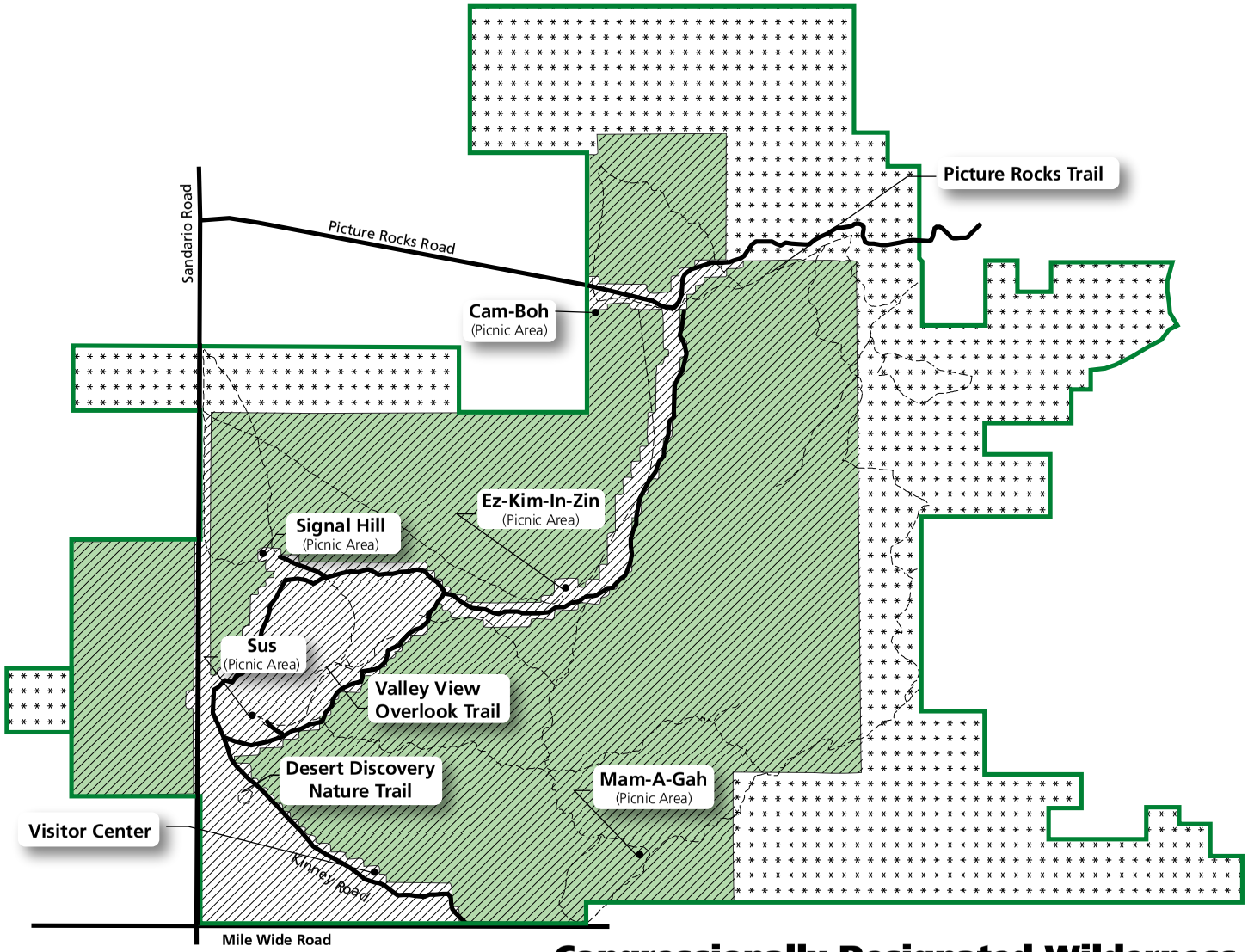
The park's goal is to provide a high-quality experience for visitors and to protect natural resources. Implementing the recommendations of the transportation study is the first step toward achieving that goal. The traffic-calming techniques range from being relatively restrictive, such as installing entrance fee kiosks and speed bumps, to being minor operational changes such as reducing speed limits.

ADAPTIVE MANAGEMENT

Adaptive management can be described as a series of repeating incremental steps: collect information on existing traffic problems, analyze it, propose appropriate interventions, implement the interventions, monitor the interventions and if needed – use additional interventions to ease the problem(s).

The adaptive management approach to traffic calming proposed for Picture Rocks Road is not a specific capital improvement at this point but rather a systematic approach intended to manage traffic concerns such as excessive speeds, accidents, and an environment that is incompatible with the desired park visitor experience. Any traffic calming devices or methods on Picture Rocks Road would consider issues such as the design of the road, traffic volumes and speeds, sight distance, emergency access, needs of visitor and non-visitor users, etc. during the design phase.

Adaptive management for traffic calming starts with the lowest level of intervention that could effectively resolve traffic-related issues. Traffic interventions would be phased-in over a number of years, as park staff monitors traffic conditions and then works with the public and local transportation agencies to determine the best course of action to take next if the lowest level of intervention is unsuccessful. To lower speeds, for example, the park could begin with low level interventions such as a public awareness campaign about speeding, additional law enforcement, and the use of mobile radar speed monitoring signs. If those interventions are not successful at reducing speeds, then the park could consider installing devices consistent with the desired visitor experience (rumble strips or turning lanes at trail crossings, adding parking pullout areas and park gateway signs, etc.). The highest level interventions (such as the use of controlled park access such as an entrance station or gate) would be considered only if many other types of traffic interventions had been tried, evaluated and proven unsuccessful. Additional compliance would be completed as required for each phase of adaptive management. The park is not proposing to close Picture Rocks Road as a part of the adaptive management process.



Legend

- PARK BOUNDARY
- TRAIL
- CONGRESSIONALLY DESIGNATED WILDERNESS
- LANDS ASSESSED FOR WILDERNESS DESIGNATION
- LANDS ADDED AFTER 1976 WILDERNESS DESIGNATION

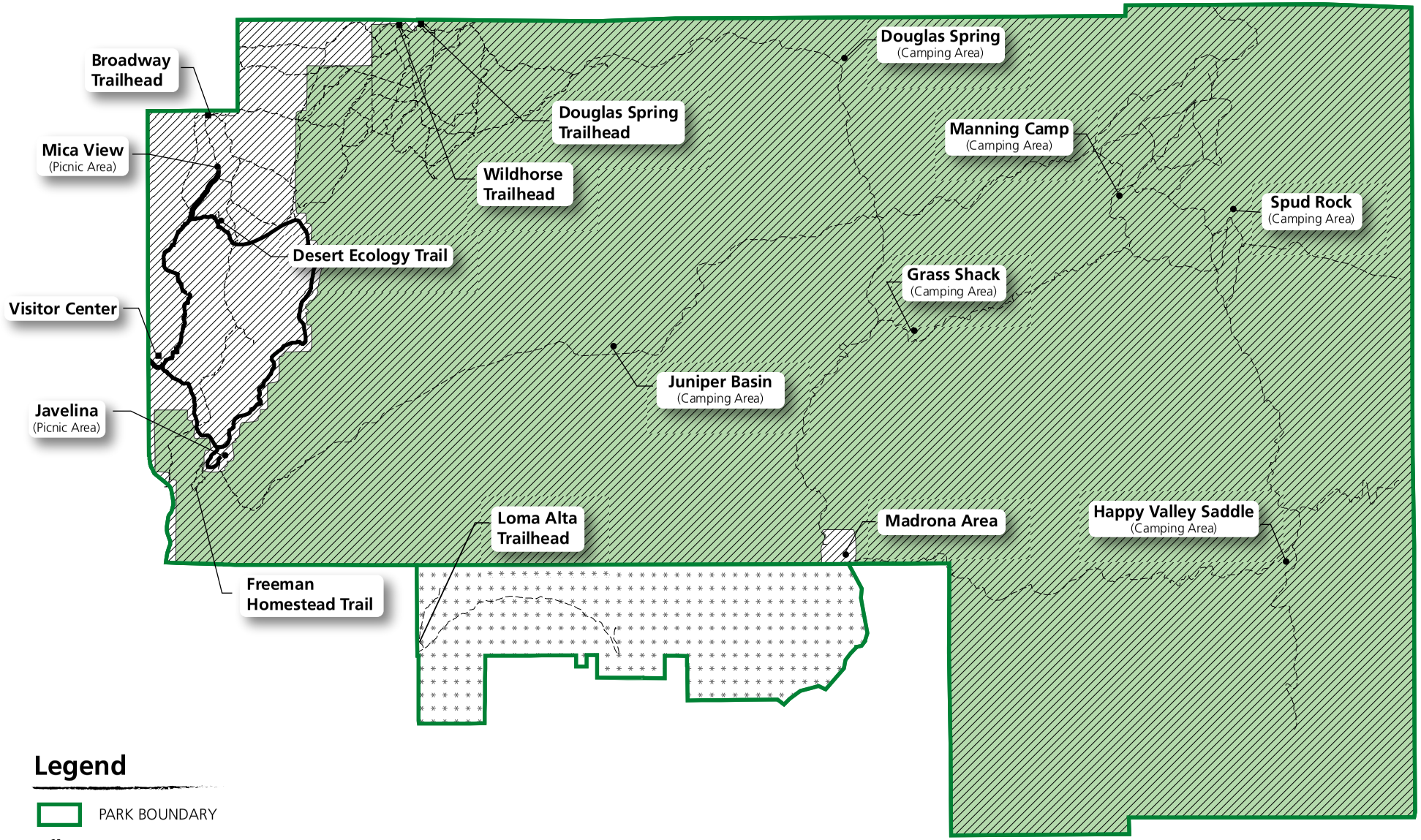
North

0 1 2 Miles

Congressionally Designated Wilderness
Tucson Mountain District

General Management Plan
Saguaro National Park

U.S. Department of the Interior • National Park Service
DSC / JUNE 2006/ 151 / 20056



Legend

- PARK BOUNDARY
- TRAIL
- CONGRESSIONALLY DESIGNATED WILDERNESS
- LANDS ASSESSED FOR WILDERNESS DESIGNATION
- LANDS ADDED AFTER 1976 WILDERNESS DESIGNATION

North

0 1 2 Miles

Congressionally Designated Wilderness
Rincon Mountain District

General Management Plan
Saguaro National Park

U.S. Department of the Interior • National Park Service
DSC / MAY 2006 / 151 / 20056

USER (CARRYING) CAPACITY

General management plans are required to include identification of and implementation commitments for user capacities for all areas of the park. The National Park Service defines user capacity as the type and level of visitor use that can be accommodated while sustaining the quality of park resources and visitor opportunities consistent with the purposes of the park. It is not necessarily a set of numbers or limits, but rather a process involving monitoring, evaluation, actions (managing visitor use), and adjustments to ensure park values are protected. The premise behind this process is that with any use on public lands comes some level of impact that must be accepted; therefore it is the responsibility of the National Park Service to decide what level of impact is acceptable and what actions are needed to keep impacts within acceptable limits. Instead of solely tracking and controlling user numbers, the superintendent and park staff manage the levels, types, behaviors, and patterns of visitor use and other public uses as needed to manage the condition of the resources and quality of the visitor experience. The monitoring component of this user capacity process helps test the effectiveness of management actions and provides a basis for informed adaptive management of public use.

There are three principal components that relate to determining the user capacity for a national park:

- ecological or physical capacity, which includes the capabilities of the natural and cultural resources to sustain levels and types of use without unacceptable damage
- sociological capacity, which includes the ability of visitors to enjoy and appreciate these resources without undue interference by other visitors
- NPS management, which includes the efforts that have been, or can be applied to the park to mitigate unwanted impacts. This component relates to the management of things such as roads, parking lots, buildings, trails, and visitor information.

The foundation for user capacity decision making is in a general management plan's qualitative descriptions of desired resource conditions, visitor experience opportunities and general levels of development and management. The plan also includes identification of the indicators and standards that will be monitored and a range of management strategies that may be employed in the future as needed. An indicator is a measurable variable that can be used to track changes in resource and social conditions related to human activity, so that progress towards desired conditions can be assessed. A standard is the management decision about the minimum acceptable condition for an indicator.

The last steps of user capacity decision-making, which continue indefinitely, are monitoring the park's indicators and standards and taking management actions to minimize impacts when needed. The indicators and standards included in the *Final General Management Plan/Environmental Impact Statement* will generally not change in the future. However, as monitoring of the park's conditions continues, park managers may decide to modify, add, or delete indicators if better ways are found to measure important changes in resource and social conditions. The results of the park's monitoring efforts, related visitor use management actions, and any changes to the park's indicators and standards will be available for public review.

DEVELOPMENT OF COST ESTIMATES

NPS decision makers and the public must consider an overall picture of the complete costs and advantages of various alternatives, including the no-action alternative, to make wise planning and management decisions for the park. Such consideration can shed light on

the cost of the no-action alternative and make possible a more legitimate comparison to the action alternatives. Class C estimates are used; these figures are not to be used for budgetary purposes or implementation funding requests.

It is important that the cost estimates contain the same elements and that they be developed with the same general assumptions so that there can be consistency and comparability among alternatives. The development of life-cycle costs provides a way to combine one-time and recurring costs (such as annual operating costs) into comparable numbers. Comprehensive life-cycle cost estimates are a key factor to be used along with the impacts and advantages of the various alternatives during the selection of a preferred alternative.

Life-cycle costing is an economic assessment of different alternatives, considering all significant costs over a specified period, expressed in equivalent dollars. Life-cycle costs reflect the aggregated initial one-time costs and recurring costs into the future over a period of time. A period of 25 years is considered a reasonable time for evaluating the life-cycle costs of alternatives in this general management plan.

The present worth method is used to convert present and future expenditures into an equivalent expenditure today. This method is based on the time value of money, or the principle that a dollar spent today will be worth more in the future because if it was invested, it would yield a return. To calculate the present worth of future annual and recurring (replacement) expenditures, the life-cycle costs are calculated with the use of a "discount rate" that is an assumed rate of return. The National Park Service uses a discount rate of 7%.

The main components of this life-cycle costing are as follows.

Initial One-Time Costs

- new development (including NPS infrastructure costs)
- major rehabilitation or restoration of existing facilities
- interpretive media (audiovisual materials, exhibits, waysides, and publications)
- resource management and visitor service costs (resource and visitor inventories, implementation planning, compliance)

Recurring or Replacement Costs

Recurring or replacement costs are important anticipated costs that recur at intervals (other than annually) within the life-cycle cost period of 25 years. Examples might be a situation when the National Park Service is supplying interpretive displays or utility systems that will be replaced every 8 to 15 years or repaving parking areas every 10 years.

Recurring Annual Costs

- annual park operating costs (staff salary and benefits, shuttle rental fees, maintenance, utilities, monitoring, contract services)
- ongoing repair and rehabilitation of facilities (the projection of past trends and known future needs into an annual estimate)

NPS Facilities Model

The National Park Service has developed facility models for several types of facilities, such as visitor centers and maintenance facilities, based on a number of factors unique to each national park system unit. This model was used in estimating the square footage required for expanding existing facilities and for new development.

Implementation

Actions directed by general management plans or in subsequent implementation plans are accomplished over time. Budget restrictions, requirements for additional data or regulatory compliance, and competing national park system priorities could prevent immediate implementation of many actions. Major or especially costly actions could be implemented 10 or more years into the future.

MANAGEMENT ZONES FOR SAGUARO NATIONAL PARK

Management zones are descriptions of desired conditions for park resources and visitor experiences in different areas of the park. Management zones are determined for each national park system unit; however, the management zones for one unit will likely not be the same for any other national park system unit (although some might be similar). The management zones identify the widest range of potential appropriate resource conditions, visitor experiences, and facilities for the park that fall within the scope of the park's purpose, significance, and special mandates. Six management zones have been developed for Saguaro National Park.

In formulating the action alternatives (alternatives 2 and 3), management zones were placed in different locations or configurations on a map of the park according to the overall intent (concept) of each of the alternatives. (Because alternative 1 represents existing conditions, and there are no existing management zones, alternative 1 maps do not show the management zones.) Please note that private, state, and county-owned properties are not zoned.

TABLE 3. SAGUARO NATIONAL PARK MANAGEMENT ZONES

	SENSITIVE ZONE	PRIMITIVE ZONE	SEMIPRIMITIVE ZONE	NATURAL ZONE	SIGHTSEEING CORRIDOR ZONE	DEVELOPED ZONE
RESOURCE CONDITION						
Natural Resources	Natural resources would be maintained in pristine condition. Fragile and unique resources would be protected. Protecting the integrity of natural processes, including the conservation of biodiversity and the functioning of ecosystem processes, would be the highest management priority. Tolerance for resource modifications or degradation would be extremely low.	Natural resources would be maintained in pristine condition. Protecting the integrity of natural processes, including the conservation of biodiversity and the functioning of ecosystem processes, would be the highest management priority. Tolerance for resource modifications or degradation would be extremely low.	Natural resources would be maintained in excellent condition, approaching or matching the pristine nature of the primitive zone. Protecting the integrity of natural processes, including the conservation of biodiversity and the functioning of ecosystem processes, would be the highest management priority. Tolerance for resource modifications or degradation would be low.	Natural resources would be maintained in excellent to good condition. In some places resource conditions could exhibit the signs of human use. The sights and sounds of adjacent residential land development could be present. Tolerance for resource modifications or degradation would be low to moderate.	Natural resources could be highly modified and manipulated to accommodate and withstand maintenance and high levels of visitor use. Tolerance for resource modifications or degradation would be moderate to high.	Natural resources could be highly modified and manipulated to accommodate and withstand high levels of visitor use. Tolerance for resource modifications or degradation would be moderate to high.

	SENSITIVE ZONE	PRIMITIVE ZONE	SEMIPRIMITIVE ZONE	NATURAL ZONE	SIGHTSEEING CORRIDOR ZONE	DEVELOPED ZONE
Geologic Processes, Landforms and Soil	Geological processes and landforms would be maintained in a natural condition. Minimal soil erosion would be permitted due to extremely low levels of use.	Geological processes and landforms would be maintained in a natural condition. Minimal soil erosion would be permitted due to low levels of use and proper trail and facility design.	Geologic processes and landforms would be maintained in a natural condition. Minor soil erosion would be permitted due to moderate levels of use and proper trail and facility design.	Geological processes and landforms would be maintained in a natural condition. Minor to moderate soil erosion would be permitted due to moderate levels of use and proper trail and facility design.	Geologic processes and landforms could be some-what modified to provide for a safe experience. Corridors would be planned and designed so that landforms main-tained a natural appearance. Minor soil erosion could be permitted along trail or road shoulders.	Geologic processes and landforms could be highly altered to provide facilities for visitor use and park operations. Moderate soil erosion could be permitted due to high levels of visitor and administrative use.
Vegetation	Native vegetation communities and patterns would be maintained to the greatest extent possible. Plant communities would be monitored regularly, and invasions by nonnative species would be aggressively controlled.	Native vegetation communities and patterns would be maintained to the greatest extent possible. Plant communities would be monitored regularly, and invasions by nonnative species would be aggressively controlled.	Native vegetation communities and patterns would be maintained where possible. Invasion by nonnative plant species could be higher than in the primitive zone due to higher levels of visitor use. Invasions would be controlled where possible.	Native vegetation communities and patterns would be maintained where possible. Invasion by non-native plant species could be higher than in the primi-tive zone due to higher levels of visitor use. Efforts would be made to detect, prevent, and control invasions of nonnative plants where possible.	Vegetation along trail or road corridors would be native species and could be modified to provide for safe, slow-speed travel. Vegetation manage-ment would strive to maintain natural appearances and density. Efforts would be made to detect, prevent, and control invasions of nonnative plants.	Appropriate native species would be used for landscaping around developed facilities. Efforts would be made to detect, prevent, and control invasions by nonnative plants.

Table 3. Saguaro National Park Management Zones

	SENSITIVE ZONE	PRIMITIVE ZONE	SEMIPRIMITIVE ZONE	NATURAL ZONE	SIGHTSEEING CORRIDOR ZONE	DEVELOPED ZONE
Wildlife Habitat	Preserving and protecting sensitive resources, natural conditions, and habitat would be the highest priority in this zone. Habitats would be restored as nearly as possible.	Preservation of wildlife habitat would be a primary goal of this management zone. Natural conditions would be preserved, and altered habitats would be restored as nearly as possible.	Preservation of wildlife habitat would be a goal of this management zone. Natural conditions would be preserved, and altered habitats would be restored as nearly as possible.	Preservation of wildlife habitat would be a goal of this management zone. Natural conditions would be preserved, and altered habitats would be restored where possible.	Corridors would be managed to reduce impacts on wildlife, such as road kill and habitat fragmentation. Adverse impacts on wildlife would be mitigated using numerous techniques such as installing culverts for wildlife crossings, diverting traffic to other routes, speed bumps.	Impacts on wildlife and habitat would be eliminated using proper facility design and siting. Adverse effects of development on wildlife and habitat would be mitigated by minimizing the size of disturbances.
Sound and Lightscapes:	Natural sounds would dominate. Distant urban sights and sounds could intrude at times. Habitats for sensitive and protected species would be free of intrusive noise.	Natural sounds and dark night skies would dominate. Distant urban sights and sounds could intrude at times. Habitats for sensitive and protected species would be free or nearly free of intrusive noise.	Natural sounds and dark night skies would be common. Nearby urban sights and sounds would intrude at times. Habitats for sensitive and protected species would be free or nearly free of intrusive noise.	Natural sounds and dark night skies would be common. Nearby urban sights and sounds would intrude.	Natural sounds and dark night skies could occur during low use periods. The sights and sounds of other park visitors would often be present. The timing, location, and duration of park operations that cause noise, such as landscaping activities, take resource needs and visitor enjoyment into account.	Natural sounds and dark night skies would not be expected in this zone. The sights and sounds of other park visitors would most often be present. The timing, location, and duration of park operations that cause noise, such as landscaping activities, take resource needs and visitor enjoyment into account.

	SENSITIVE ZONE	PRIMITIVE ZONE	SEMIPRIMITIVE ZONE	NATURAL ZONE	SIGHTSEEING CORRIDOR ZONE	DEVELOPED ZONE
Fire Management	Fire management would vary based on the vegetation that occurs in this zone. Arizona upland desert-scrub fire starts would be suppressed. Fires that start in desert grasslands or forested vegetation areas would be managed for resource protection and visitor safety.	Fire management would vary based on the vegetation that occurs in this zone. Arizona upland desert-scrub fire starts would be suppressed. Fire starts in forested vegetation areas would resume and continue its natural role in the ecosystem. Prescribed fire, would be used where appropriate. Wildland fire use would be managed to maintain a natural fire regime, benefiting resources.	Fire management would vary based on the vegetation that occurs in this zone. Arizona upland desert scrub fire starts would be suppressed. Fires that start in desert grasslands or forested vegetation would be managed for resource protection and visitor safety.	Fire management would vary based on the vegetation that occurs in this zone. Fires in Arizona upland desert scrub would be suppressed. Fires that start in desert grasslands or forested vegetation zones would be managed for resource protection and visitor safety.	Fire management would be intensive for vegetation along road corridors. Frequent patrols and surveillance would be used to reduce the risk of fire.	Fires management would be intensive to protect park facilities, visitors, and desert scrub vegetation communities.
VISITOR OPPORTUNITIES/EXPERIENCE						
Overall Visitor Experience	Visitors would have outstanding interpretive opportunities because access would be provided only on a ranger-led interpretive tour.	Visitors would have outstanding opportunities for primitive recreation, solitude, adventure, self-discovery, and self-directed learning.	Visitors would have opportunities for primitive recreation with some solitude, adventure, self-discovery, and self-directed learning.	Visitors would have easy access to a wide range of recreational activities with some opportunities for solitude, adventure, and self-discovery.	Visitors would enjoy a slow, safe, relaxing, meandering tour route for vehicles and bicycles. There would be multiple opportunities to stop along the route for sightseeing, wildlife viewing, picnicking, or interpretive opportunities.	Visitors of all ages and abilities would have opportunities to learn about park resources. Visitor comforts and basic needs would be met, and there would be numerous opportunities for programs and interactions with park staff.

Table 3. Saguaro National Park Management Zones

	SENSITIVE ZONE	PRIMITIVE ZONE	SEMIPRIMITIVE ZONE	NATURAL ZONE	SIGHTSEEING CORRIDOR ZONE	DEVELOPED ZONE
Interaction with Resources	Visitors would be in close contact with the rich resources of the park. Natural sights and sounds would dominate the visitor experience.	Visitors would be in close contact with the rich resources of the park. Natural sights and sounds would dominate the visitor experience.	Visitors would be in close contact with the rich resources of the park. Natural sights and sounds could dominate; however, the sights and sounds of nearby urban communities could intrude.	Visitors would be in a natural setting, with opportunities for close contact with the rich resources of the park nearby. Natural sights and sounds could be present; however, the sights and sounds of other visitors and urban communities would intrude.	Visitors would primarily enjoy seeing resources and have opportunities for interaction with park resources. The sights and sounds of other visitors and urban communities would dominate.	Visitors would have some opportunities for interaction with park resources. The sights and sounds of other visitors would dominate.
Interpretation/ Education/ Orientation	Interpretation and education would be provided on ranger-led tours.	Interpretation and education opportunities would be minimal and include brochures, wayside exhibits, and interpretive signs primarily for visitor safety. Ranger-led tours could be provided.	Interpretation and education opportunities would be moderate and include brochures, wayside exhibits, and interpretive signs. Ranger-led tours could be appropriate. Direction and safety signs would be present.	Interpretation and education opportunities would be moderate and include brochures, wayside exhibits, interpretive signs, or nature trails. Ranger-led programs would be appropriate. Direction and safety signs would be present.	Interpretation and education opportunities would be moderate – including scenic overlooks, wayside exhibits, or nature trails. Direction and safety signs would be present.	Interpretation and education opportunities would be extensive including orientation, slide shows, exhibits, books. Nature trails with wayside exhibits and interpretive signs could be present. Ranger-led programs would be present.

	SENSITIVE ZONE	PRIMITIVE ZONE	SEMIPRIMITIVE ZONE	NATURAL ZONE	SIGHTSEEING CORRIDOR ZONE	DEVELOPED ZONE
Use Levels/Density/ Encounters	Visitation levels would be extremely low. Most opportunities would be in small guided tour groups. Encounters with park staff and other visitors would be high.	Visitation levels would be low. Encounters with park staff and other visitors along trails would generally be infrequent due to the dispersed nature of the experience. Encounters with a few other visitors in backcountry campsites in the Rincon Mountain District would be expected.	Visitation levels would be moderate. Encounters with park staff and other visitors on trails would generally be moderate due to the dispersed nature of the experience. Encounters with other visitors would be high during peak use and at entry points or points of interest.	Visitation levels would be moderate. Encounters with park staff and other visitors on trails would be generally moderate due to the dispersed nature of the experience. Encounters with other visitors would be high during peak use and at entry points or points of interest.	Visitation levels would be moderate to high. Encounters with other visitors would generally be frequent particularly at pull-offs, overlooks, interpretive exhibits, and waysides.	Visitation levels would be extremely high. Encounters with other visitors and park staff would be routine.

Table 3. Saguaro National Park Management Zones

	SENSITIVE ZONE	PRIMITIVE ZONE	SEMIPRIMITIVE ZONE	NATURAL ZONE	SIGHTSEEING CORRIDOR ZONE	DEVELOPED ZONE
Activities	Activities would be ranger-led walks or hikes. This zone would be for day use only.	Activities would include back-packing, hiking, horseback riding, running, and viewing flora, fauna, and night skies. Backcountry camp-ing would be permitted in the Rincon Mountain District. This zone would be for day use only except for over-night camping in the Rincon Mountain District. Visitors would be required to stay on trails; some opportunities would exist for off-trail travel above 4,500 feet.	Activities would include hiking, horseback riding, running, and viewing flora and fauna. This zone would be for day use only. Visitors would be required to stay on trails.	Activities would include hiking, horseback riding, running, biking, and viewing flora and fauna. This zone would be for day use only. Visitors would be required to stay on trails.	Activities would include motorized touring, sightseeing, bicycling, running, walking, dog walking, and specifically permitted activities (e.g., organized run). This zone would be for day use. Visitors would be required to stay on trails or roads.	Activities would include picnicking, running, walking, biking, wildlife viewing, dog walking, and interpretive and educational programs. Visitors would use this zone for day use only. Visitors would be required to stay on trails and roads.

	SENSITIVE ZONE	PRIMITIVE ZONE	SEMIPRIMITIVE ZONE	NATURAL ZONE	SIGHTSEEING CORRIDOR ZONE	DEVELOPED ZONE
Skills, Risk, Time Required	Visitors would need a moderate to high level of physical ability. Time commitment would be a few hours to tour this zone.	Visitors would need considerable physical endurance and ability. An in-depth knowledge of outdoor skills and being totally self-sufficient would be required. Time commitment could be several hours to several days to experience this zone.	Visitors would need an average level of physical ability. A moderate knowledge of outdoor skills and being relatively self-sufficient would be recommended. Time commitment could be moderate (<4 hours) to experience this zone.	Visitors would need an average level of physical ability. A moderate knowledge of outdoor skills and being relatively self-sufficient would be recommended. Time commitment could be moderate (<4 hours) to experience this zone.	Visitors of all levels of physical ability could enjoy this zone. Knowledge of outdoor skills and self-sufficiency would not be needed. Time commitment could be 1 to 2 hours to experience this zone.	Visitors of all levels of physical ability could enjoy this zone. Knowledge of outdoor skills and self-sufficiency would not be needed. Time commitment would vary, depending on information or services desired.
LEVEL OF DEVELOPMENT						
Type/Character of Access Routes	Absolutely essential natural trails and signs for visitor and staff safety.	A limited number of designated natural surface trails.	A low to moderate number of designated natural surface trails.	A moderate number of natural surface and paved trails.	A highly developed trail/road corridor with paved and unpaved surfaces.	A highly developed trail/road area with paved and unpaved surfaces.
Amount and Character of Signs	There would be no interpretive signs.	Minimal directional and safety signs would be permitted.	Minimal directional and safety signs would be permitted.	Directional, safety, and interpretive signs would be permitted.	Regulatory, directional, safety, and interpretive signs would be permitted.	Regulatory, directional, safety, and interpretive signs would be permitted.
Trail Type (see appendix E for definitions)	Trail type C could be developed. Light use. High skills needed. Unpaved surfaces, natural materials, moderate rock or root protrusions.	Trail type C could be developed. Light to moderate use. Intermediate to high skills needed. Unpaved surfaces, natural materials, moderate rock or root protrusions.	Trail types B and C could be developed. Heavy to light use. Beginner to high skills needed. Unpaved surfaces, natural materials, moderate to occasional rock or root protrusions.	Trail types A and B could be developed. Heavy use. ADA accessible, minimal skills needed. Paved and unpaved surfaces, none to moderate rock or root protrusions.	Trail types A and B could be developed. Heavy use. ADA accessible, minimal skills needed. Paved and unpaved surfaces, none to moderate rock or root protrusions.	Trail types A and B could be developed. Heavy use. ADA accessible, minimal skills needed. Paved and unpaved surfaces, none to moderate rock or root protrusions.

Table 3. Saguaro National Park Management Zones

	SENSITIVE ZONE	PRIMITIVE ZONE	SEMIPRIMITIVE ZONE	NATURAL ZONE	SIGHTSEEING CORRIDOR ZONE	DEVELOPED ZONE
Types of Facilities	No facility development other than what might be needed for resource protection and visitor safety. Any development footprint would be the minimum required to meet the needs of resource protection and visitor safety.	Facilities could include a small number of designated, natural surface trails and horse hitching rails. Support facilities may be permitted if determined necessary to support preservation of resource values. In the Rincon Mountain District only, facilities could include a small number of designated backcountry campsites with associated pit toilets, fire rings, and food storage containers. This zone will have the smallest footprint for any new or existing facilities. The footprint will be the minimum size needed to protect resources and meet health, safety and visitor use requirements.	Facilities could include designated, natural surface trails, and horse hitching rails. Support facilities may be permitted if determined necessary to support preservation of resource values. The footprint of any new or existing facilities will be the minimum size needed to protect resources and meet health, safety and visitor use requirements. Some minor changes might be permitted when necessary to provide for trails, pit toilets, and other minimal visitor facilities.	Facilities could include designated, natural and paved surface trails, and horse hitching rails. Facilities could include shade ramadas, restrooms, benches, and drinking fountains. The footprint of any new or existing facilities would be the minimum size to meet health, safety, and visitor use requirements. Some moderate changes might be permitted when necessary to provide for trails, and other minimal visitor facilities.	Facilities could include designated, natural and paved surface trails, pull-outs, wayside exhibits, interpretive trails, and trailheads. The footprint of any new or existing facilities would be determined based on the size required to meet health, safety, visitor use, and administrative needs.	Visitor facilities could include visitor centers, fee/entrance kiosks/stations, trailheads, picnic areas, wayside exhibits, and parking areas. Administrative facilities could include maintenance, headquarter operations, parking areas, and employee housing. The footprint of any new facilities would be determined based on the size required to meet health, safety, visitor use, and administrative needs.

	SENSITIVE ZONE	PRIMITIVE ZONE	SEMIPRIMITIVE ZONE	NATURAL ZONE	SIGHTSEEING CORRIDOR ZONE	DEVELOPED ZONE
MANAGEMENT ACTIVITIES						
Resource Management and Visitor Protection Activities	Management activities would include research and monitoring activities, wild fire suppression, wild land fire use, and prescribed fire operations, with limited staff intervention for resource protection.	Management activities could include research, wild fire suppression, wild land fire use, and prescribed fire operations, resource management, and backcountry patrols.	Management activities could include research, wild land fire suppression operations, resource management, and backcountry patrols.	Management activities could include research, resource management, and backcountry patrol.	Management activities could include road patrol, resource impact mitigation, and interpretive and educational activities/services.	Management activities could include road patrol, resource impact mitigation, and interpretive and educational activities/services.
Visitor Management	No physical controls (fences, barriers) would be placed on visitors. A high degree of regulatory controls (ranger-led tours) would be placed on visitor movement and access.	A low degree of physical controls (fences, barriers, designated trails) would be placed on visitor movement and access. Regulatory controls (e.g., no off-trail travel below 4,500 feet, group size and length-of-stay limits) could be used to manage visitors for safety and resource protection.	A low degree of physical controls (fences, barriers, designated trails) would be placed on visitor movement and access. Regulatory controls (e.g., no off-trail travel below 4,500 feet, group size) could be used to manage visitors for safety and resource protection.	A low degree of physical controls (e.g., fencing, barriers) would be placed on visitor movement and access. Regulatory controls (e.g., no off-trail travel below 4,500 feet) could be placed on visitor movement and access.	A moderate degree of physical controls (e.g., fencing, barriers) would be placed on visitor movement and access. Regulatory controls (e.g., no speeding) would be placed on visitor movement and access.	A high degree of physical controls (e.g., fencing, barriers) would be placed on visitor movement and access. Regulatory controls (e.g., no off-trail hiking) would be used for visitor movement and access.
TRAIL TYPES (see appendix E))	C	C	B, C	A, B	A, B	A, B

CULTURAL RESOURCES — PARKWIDE MANAGEMENT ZONE		
Resource Condition	**Visitor Experience**	**Level of Management and Facilities**
Archeological resources, historic structures, cultural landscapes, and ethnographic resources as possible traditional cultural properties would be identified, evaluated for national register eligibility, protected, and preserved unless it is determined through appropriate environmental analysis and consultations with the Arizona state historic preservation officer, Native American tribes, and other interested parties that disturbance is unavoidable. If significant resources must be disturbed, adequate mitigation would be undertaken beforehand. The park would continue to consult with associated American Indian tribes to identify ethnographic resources in order to develop and accomplish programs in a way that respects the beliefs, traditions, and other cultural values of the Indians who have ancestral ties to park lands.	Visitors would have opportunities to learn about and see the cultural resources of the park. These resources might include structures, landscapes, archeological sites, rock art, or historic districts. Visitor "discovery" sites might be enhanced with interpretive signs.	Inventories will be conducted to identify and evaluate cultural resources and nominate appropriate sites to the National Register of Historic Places. Monitoring sensitive cultural resources, such as historic structures, prehistoric rock art, and village sites and rock shelters, might result in documentation, stabilization, or hazard abatement. Required compliance with Section 106 of the National Historic Preservation Act would be met for all undertakings. Some historic structures might be adapted to accommodate visitor or administrative uses.

ALTERNATIVE 1: THE NO-ACTION ALTERNATIVE

CONCEPT

The no-action alternative is a continuation of current management and trends. The no-action alternative is developed for two reasons: It is almost always a viable choice in the range or reasonable alternatives, and it serves as a basis of comparison with the two action alternatives. Examining the no-action alternative is often helpful in understanding why the National Park Service or the public may believe that certain future changes are necessary or advisable.

The park's enabling legislation and NPS management policies would provide guidance for all of the alternatives, and under alternative 1, guidance from the 1988 *General Management Plan* would continue to guide park management. The park has implemented many of the actions identified in the 1988 plan. The park would continue to be managed as it is today, with no major change in management direction (see Alternative 1 maps).

RESOURCE CONDITIONS

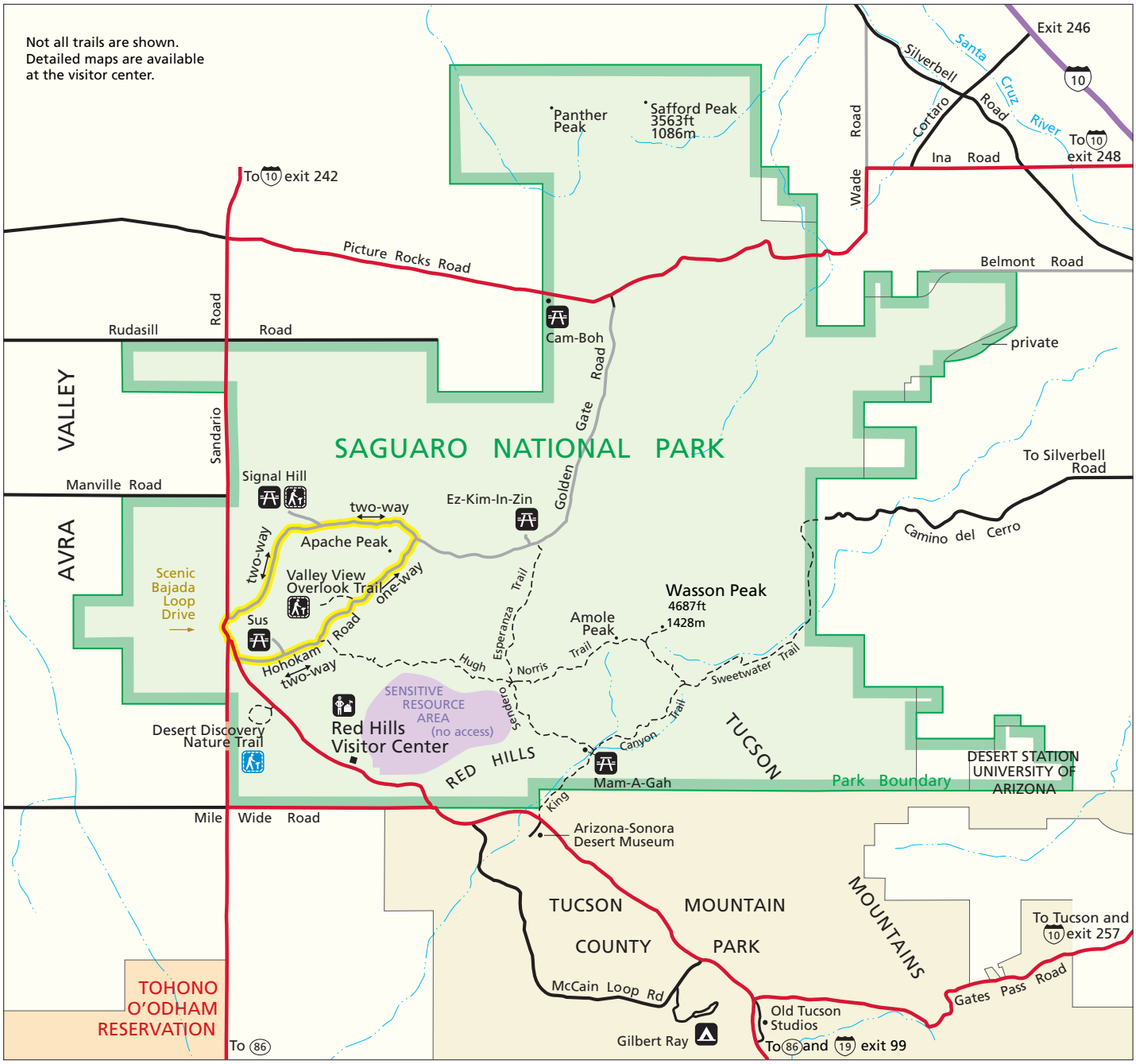
- Natural resources and processes would be preserved while accommodating a range of visitor uses and experiences. Fragmentation in habitats, corridors, and regional ecosystems would continue.
- Cultural resources would continue to be preserved, protected, and interpreted.

ROADS

- Multiple entrances to the Tucson Mountain District would continue to allow access for non-park visitors, resulting in excessive traffic, high speeds, and conflicts between commuters and park visitors.
- The existing road corridors would continue to be managed through traffic signs and ranger patrols. Traffic laws and regulations would continue to be enforced by park rangers at the current levels.
- Park management would continue to discourage visitors from traveling some Tucson Mountain District roads such as Picture Rocks Road and Sandario Road due to safety concerns caused by excessive commuter speeds and volume.
- Resource damage would continue along roadways. Staff would not control infestations of nonnative plants along roadways due to unsafe conditions caused by heavy traffic and excessive speeds.

TRAILS

- The current Cactus Forest and Tucson Mountain District trail plans would guide trail management in the park. User conflicts, maintenance problems, duplicate/parallel trails, and resource damage would continue to be issues. Closure and revegetation of social trails would continue as recommended in the current trail plans.
- Biking would continue to be permitted on park roads and on the middle section of the Cactus Forest Trail. Biking would not be permitted on any additional trails.
- The Camino Loma Alta trailhead to the Hope Camp, North Hope, and the Ridge View trails would remain informal. The trails would continue to be used by hikers and equestrians. There would be limited opportunities to connect to regional trails outside park boundaries.
- There would be no new trailheads or trails developed.



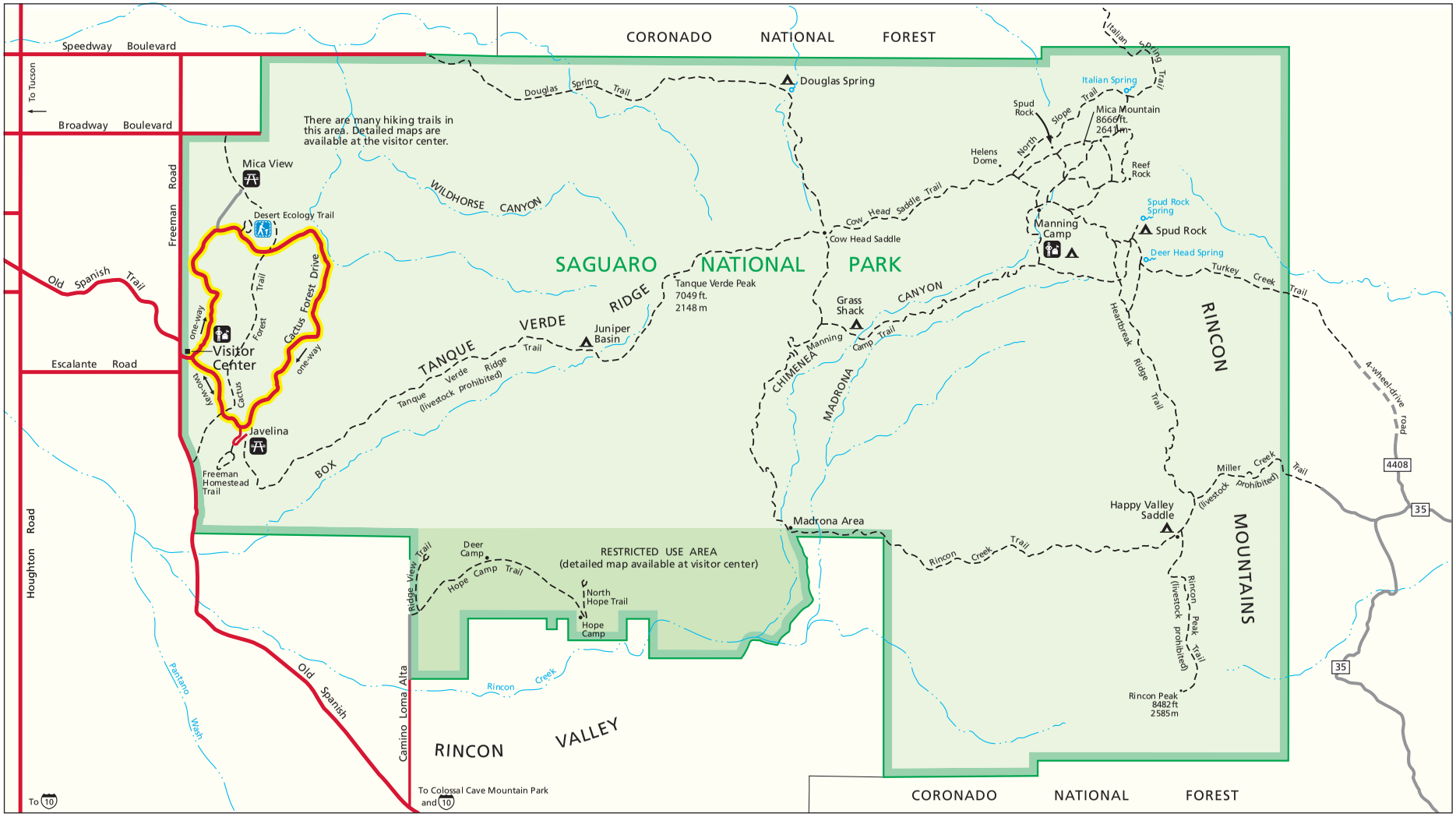
Alternative 1 - No Action Alternative
Tucson Mountain District

General Management Plan
Saguaro National Park

U.S. Department of the Interior • National Park Service
DSC / JUNE 2006 / 151 / 20057

North

0 1 2 Kilometers
0 1 2 Miles



Alternative 1 - No Action Alternative
Rincon Mountain District

General Management Plan
Saguaro National Park

U.S. Department of the Interior • National Park Service
DSC / JUNE 2006 / 151 / 20058

North

0 1 2 Kilometers
0 1 Mile 2

MADRONA/CHIMENEA AREA

- Access to the Madrona/Chimenea area would continue to be limited. Visitors would need to travel several miles over difficult trails to access the area.
- The Civilian Aeronautical Administration building would remain and would be monitored.
- When funding permits, all other facilities would be removed as required by the state health department.

MANNING CAMP (RINCON MOUNTAIN DISTRICT)

Current activities and facilities would remain.

CAMPING

- Camping would continue to be permitted in the backcountry of the Rincon Mountain District. No additional campsites would be developed.

INTERPRETATION AND EDUCATION PROGRAMS

- The Rincon Mountain District visitor facility would remain at its current size, which would not meet the needs of a growing population, particularly a rapidly expanding school system.
- The interpretive displays in the Rincon Mountain District visitor center would remain outdated.

MANAGEMENT ACTIVITIES AND FACILITIES

- Facilities would remain at their current levels; staffing would not be increased.
- Administrative facilities in the Rincon Mountain District would remain inadequate. This district would remain too small to meet staff needs. This district would continue to serve local residents as its primary visitors.
- The Manning Camp area would continue to be used for fire crew and other activities. Facilities to support administration, such as the water supply system, the vault toilet, the historic cabin, the corral, and the tent cabins, would remain.

BOUNDARY ADJUSTMENT

There would be no change to the current boundary.

PARTNERSHIPS

- The park would continue to have relationships with its partners. These partnerships include universities, colleges, schools, the Rincon Institute, and friends groups.

ESTIMATED COSTS

Costs for alternative 1 are given for comparison to other alternatives only; they are not to be used for budgetary purposes or implementation funding requests. Although the numbers appear to be absolutes, they represent a midpoint in a possible range of costs. The costs developed are total life-cycle costs, which are inclusive of all initial costs (new development, including transportation infrastructure costs, rehabilitation, and interpretive media), replacement costs, and recurring annual costs such as park operations (see page 55).

All these costs are projected out for 25 years. They are shown as the worth in today's dollars. Life-cycle costs are explained in

detail beginning on page 55. The initial capital cost (deferred maintenance) for alternative 1 would be $5,820,299. The recurring annual costs would be $2,980,404. The maintenance or replacement costs would be $291,760. The total life-cycle cost for this alternative would be $9,092,463.

Note that these costs do not include the costs for the additional plans/ studies needed that are detailed near the end of this chapter.

Note also that actions directed by general management plans or in subsequent implementation plans are accomplished over time. Budget restrictions, requirements for additional data or regulatory compliance, and competing national park system priorities could prevent immediate implementation of many actions. Major or especially costly actions could be implemented 10 or more years into the future.

TABLE 4. ESTIMATED COSTS FOR ALTERNATIVE 1

Initial Capital Costs	$5,820,299
Annual Costs	$2,980,404
Replacement Costs	$ 291,760
Total Life Cycle Costs*	$9,092,463

*Includes capital costs, replacement costs, and annual costs

*calculated for 25 years at 7% discount rate

Range of Costs – based on cost engineering standard of -30%/+50% for order-of-magnitude estimates (AACE International Recommended Practice No. 18R-97, Figure 31a (ANSI Standard Z94.0). Example: Estimate of $1,000,000 has an accuracy range of $700,000 to $1,500,000.

ALTERNATIVE 2: THE PREFERRED ALTERNATIVE

CONCEPT

In alternative 2 the emphasis would be on protecting the park's ecological processes and biological diversity by connecting wildlife and plant habitats. Management efforts would focus on creating connections between isolated wildlife habitats and corridors. Park managers would make choices and take actions that would best achieve ecological/biological diversity. Visitation would be managed and redirected, when necessary, to protect sensitive resources and minimize impacts on resources. Basic facilities for visitor safety and services would be provided inside the park. Appropriate access would be provided for visitors to enjoy the park and learn about the Sonoran Desert and associated habitat.

RATIONALE

This alternative concept was developed because the biological diversity and ecological processes of the park — remarkable due to the range of elevation and mix of riparian and desert habitats — are in danger from habitat fragmentation. In addition, the public expressed concern that overuse of the park and increasing urbanization would threaten the park's qualities of solitude, quiet, and naturalness. This alternative would help mitigate the effects of habitat fragmentation while adaptively managing for recreational opportunities consistent with conserving natural resources and protecting wilderness areas.

RESOURCE CONDITIONS

- Primitive and Semi-primitive zones, which call for natural resources to be maintained in pristine to excellent condition, would make up the largest area of the park. Tolerance for resource modifications or degradation would be low, and preservation of wildlife habitat would be a major management focus in these zones. Park management would seek to reduce fragmentation of habitats and isolated wildlife corridors. Revegetation efforts would increase to improve habitat conditions.
- Cultural resources would be preserved and protected as described in the parkwide cultural resource management zone, including conducting inventories to identify and evaluate cultural resources and nominate appropriate sites to the National Register of Historic Places. Cultural resources that are on or eligible for the national register would be preserved and protected. Specifically, Cactus Forest Drive in the Rincon Mountain District, which was designed and built by the Civilian Conservation Corps (CCC), would continue as a sightseeing road, preserving its cultural landscape. In addition, the CCC camp area in the Tucson Mountain District would continue to be preserved, and a few trails with signs and wayside exhibits in the area could be added to facilitate and manage visitor access to the area.
- Occasional ranger-led tours to off-trail historic sites could also be provided.

ROADS

Park staff would continue to monitor and mitigate wildlife mortality along road corridors in both districts. All roads in the park would be in the Sightseeing Corridor Zone except for Golden Gate Road which would be in the Natural Zone. Additional compliance and public involvement would be done, if required, for the following actions.

Tucson Mountain District

- Golden Gate Road (between Ez-Kim-In-Zin picnic area and Picture Rocks Road) would be placed in the Natural Zone, and the road would be converted to a multiuse trail.
- The desired visitor experience and resource conditions (as outlined in the Sightseeing Corridor Zone) for Picture Rocks Road would be achieved by installing a potential range of traffic-calming strategies/ devices. These strategies/devices would begin at the least intrusive level. The park staff would then monitor visitor safety and resource conditions along the roads to determine if any additional road management applications were necessary. If additional devices/strategies were still needed to achieve desired conditions, the next level of traffic calming would be applied. This process would continue until desired conditions were met. The process of continual monitoring and evaluating is known as adaptive management (see page 50).
- If additional management strategies do not sufficiently mitigate impacts to resources and visitor experiences, the park staff would then encourage and work with Pima County to develop other alternatives outside the park to using Picture Rocks Road.
- The scenic Bajada Loop Drive would be redesigned into a narrower, paved, one-way scenic loop. A new section of this loop drive would be built to move park traffic off Sandario Road. The removal of loop drive/park traffic from Sandario Road would improve safety conditions along both Sandario Road and the scenic Bajada Loop Drive. As with current management, the loop drive would continue to be closed at night.

Rincon Mountain District

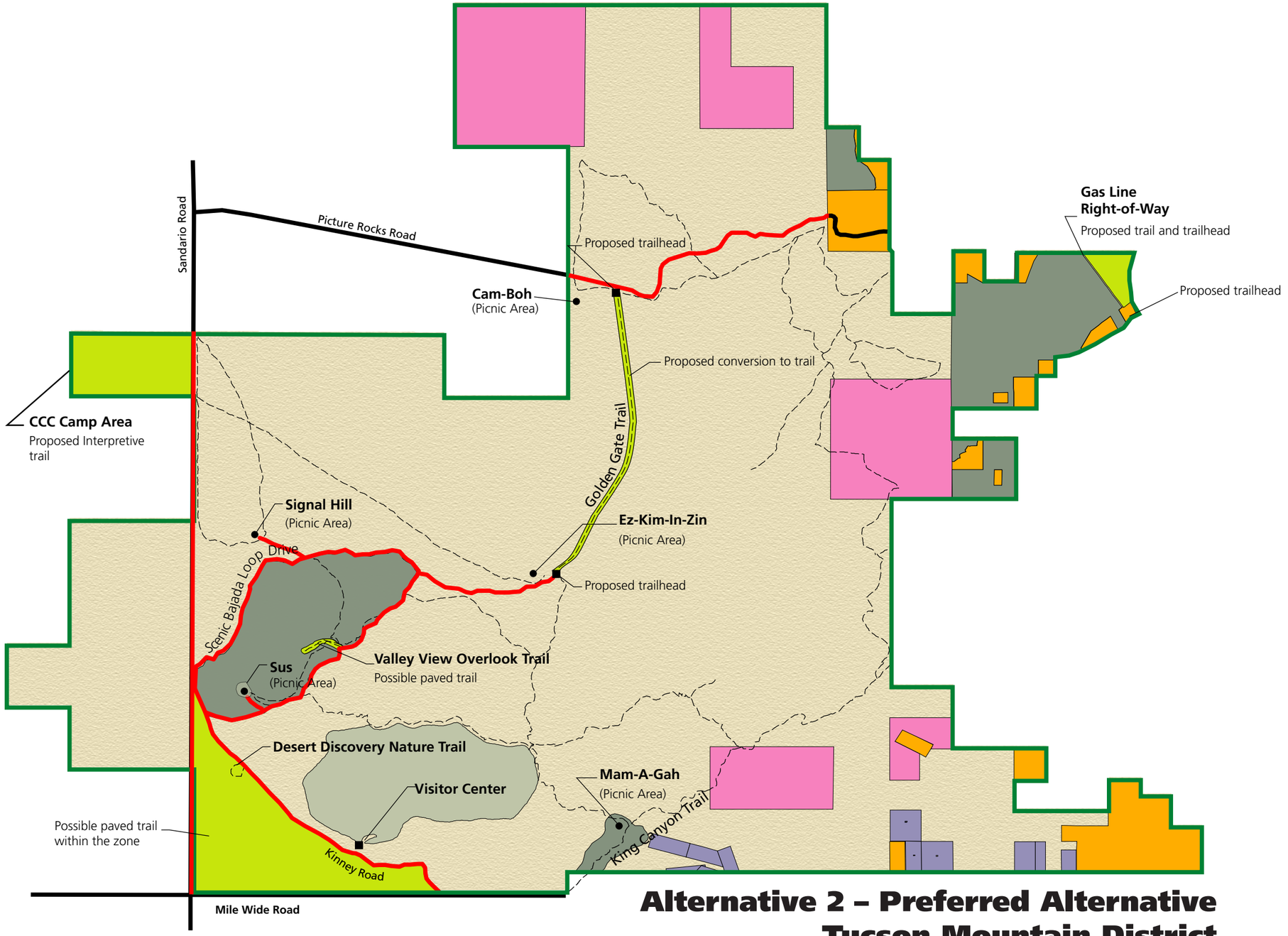
- The Cactus Forest Loop Drive would continue as a motor tour route and be placed in the Sightseeing Corridor Zone.

TRAILS

A comprehensive trails plan is underway that will fully address trail locations, designs, and types responding to the overall direction provided in the general management plan. The comprehensive trails plan would contain the details for the actions proposed in this alternative described below.

Tucson Mountain District

- Golden Gate Road (between Ez-Kim-In-Zin picnic area and Picture Rocks Road) would be converted to a hiking trail, and might also be used for bicycling and horseback riding. Trailhead parking would be developed at both ends of the trail. Trailhead parking would be developed at both ends of the proposed Golden Gate Trail (see Alternative 2 map).
- Opportunities for developing bicycling trails would be explored along the gas pipeline right-of-way near the eastern boundary of the district. Redesign of the Kings Canyon trailhead would be explored.
- The Natural Zone near the Valley View Overlook as well as the Natural Zone east of Sandario Road and south of Kinney Road would be considered for development of new ADA-accessible trails.
- The Natural Zone in the northwest section of land west of Sandario would be considered for interpretive trails and signs to be developed near the CCC camp.



Legend

- PARK BOUNDARY
- TRAIL
- STATE LAND
- COUNTY LAND
- PRIVATE LAND

Management Zones

- SENSITIVE ZONE
- PRIMITIVE ZONE
- SEMI-PRIMITIVE ZONE
- NATURAL ZONE
- SIGHTSEEING CORRIDOR ZONE
- DEVELOPED ZONE

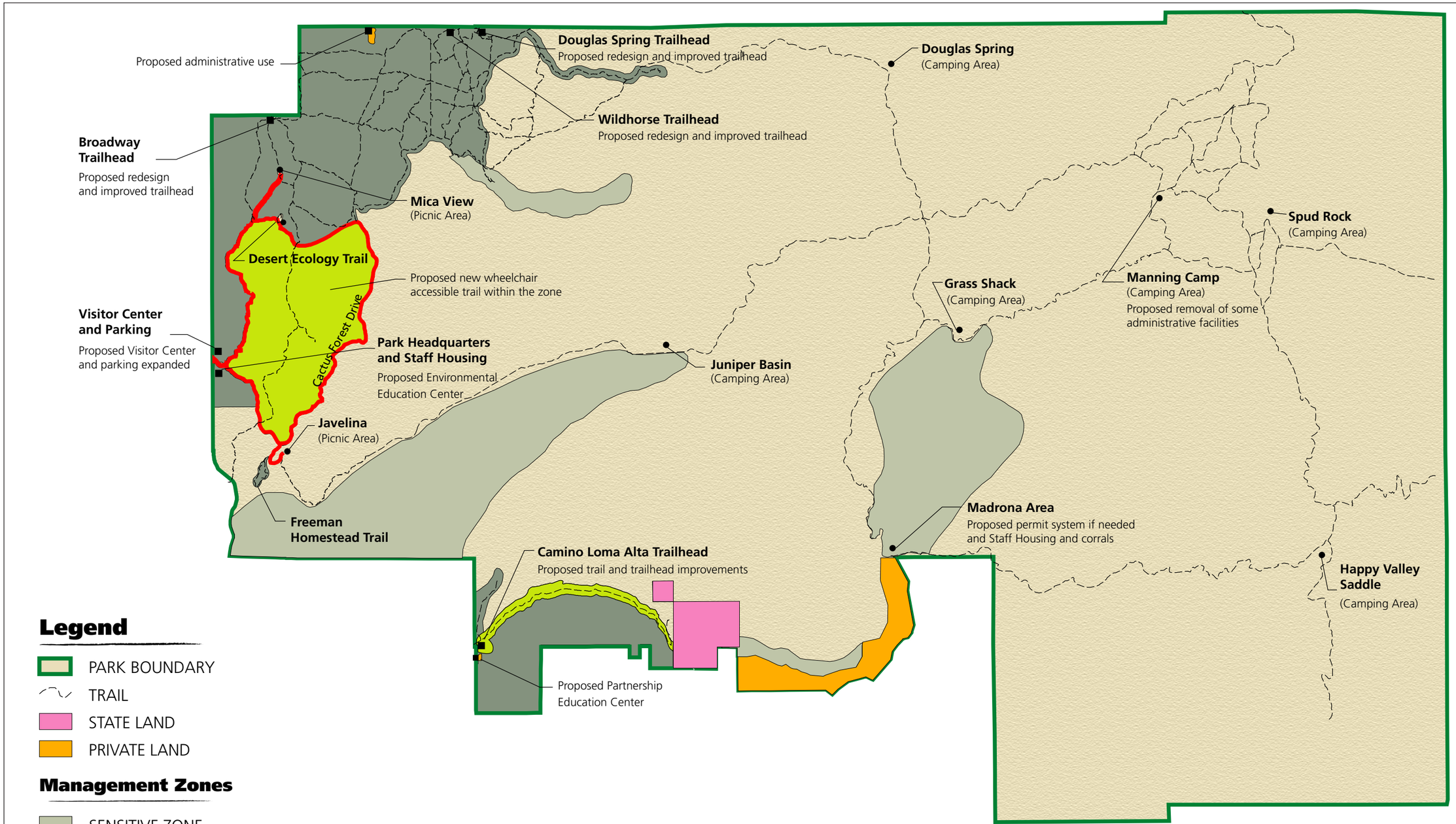
North

0 1 2 Miles

Alternative 2 – Preferred Alternative
Tucson Mountain District

General Management Plan
Saguaro National Park

United States Department of the Interior • National Park Service
DSC / May 2006 / 151 / 20059



Alternative 2 – Preferred Alternative
Rincon Mountain District

General Management Plan
Saguaro National Park

United States Department of the Interior • National Park Service
DSC / May 2006 / 151 / 20060

Rincon Mountain District

- Biking opportunities would be explored along the Hope Camp Trail.
- The Camino Loma Alta trailhead would be improved.
- The Douglas Springs, Wildhorse, and Broadway trailheads would be redesigned/improved.
- Development of additional wheelchair accessible trails would be explored.

Trails in Both Districts

- Off-trail travel below 4,500 feet would be restricted to protect cultural and natural resources.
- Regional trail connections would be explored in conjunction with partners. The location of regional trail connections would be identified as part of the comprehensive trails plan.
- The location of trail access points and possible trailheads within the park would be identified.
- The need for single-use trails to reduce trail user conflicts would be assessed as part of the comprehensive trails plan.
- The need for trail realignments to protect resources would be evaluated.
- Sustainability would be considered in developing/improving the trail system.

MANAGEMENT OF MADRONA/ CHIMENEA AREA (RINCON MOUNTAIN DISTRICT)

- Visitor use at Madrona would continue to be highly regulated to protect sensitive natural and cultural resources. The area would be systematically monitored as part of the park's user capacity and biological monitoring program. The park would implement a limited permit system when monitoring indicates that visitation has reached a level that negatively affects this highly sensitive area. The historic fireplace with chimney (chimenea) would be monitored and stabilized.
- The historic Civilian Aeronautical Administration building would be donated to an interested organization. If no interest was expressed, the structure would be documented and razed.
- Staff housing and new corrals would be developed and appropriately located to minimize impacts to resources. Utilities and associated support systems would be upgraded as necessary. On-site staff would be able to provide protection to the site and interpretation and information on resource protection.

MANNING CAMP (RINCON MOUNTAIN DISTRICT)

- Fire management and trail maintenance staging activities would be simplified.
- A comprehensive analysis would be conducted to identify the most efficient operation for fire and trail operational activities.
- The park staff would develop a shared work center/duty station with the U.S. Forest Service for initial fire response.
- Some support facilities would remain, such as the vault toilet, water system, corrals, and hitching posts.
- The number of tent platforms and propane equipment would be reduced.
- Seasonal spike camps would be set up for trail maintenance activities when these needs are a considerable distance from Manning Camp.
- The recommendations of the *Manning Cabin Condition Assessment* (NPS 2005a) would be implemented to protect the cabin's historic fabric. These recommendations include rehabilitating and monitoring the cabin, reducing the amount of supplies and equipment stored inside, and moving propane tanks away from the exterior walls.
- Ranger presence would be maintained during the summer season for

interpretation, law enforcement, initial fire response, and routine maintenance.

CAMPING

- Camping opportunities in the Rincon Mountain District would take place in designated campsites, and camping would not be allowed in the Tucson Mountain District, as is currently the case.

INTERPRETATION AND EDUCATION PROGRAMS

- The Rincon Mountain District visitor center would be expanded (2,200 to 3,200 square feet) to provide additional exhibit and office space. The Tucson Mountain District visitor center would remain the same.
- An outdoor environmental education center could be developed at the south boundary of the Rincon Mountain District (in the vicinity of the Camino Loma Alta trailhead) to provide additional interpretive opportunities.
- A park structure could be reused as an education center when current uses are relocated.
- Additional opportunities for waysides and interpretive trails would be explored parkwide.

MANAGEMENT ACTIVITIES AND FACILITIES

- Expansion in the Rincon Mountain District visitor center (2,200 to 3,200 square feet) would allow for more efficient park operations.
- The annex building would be removed when its administrative functions can be moved to other locations, e.g., to converted park housing, to the life estate property, or to off-site locations.
- Staffing would be shared with partners if an outdoor education center was developed near Camino Loma Alta.
- An existing park building near park headquarters could be rehabilitated for use as an education center.
- State Trust, county, and private lands within park boundaries would be acquired from willing sellers when available and feasible.
- The facilities in the life estate property in the Rincon Mountain District would be used for NPS administrative purposes.

BOUNDARY ADJUSTMENTS

The park would explore all opportunities to ensure the purpose of the park was accomplished by protecting fundamental resources and values. Resource protection, such as for wildlife habitat and corridors, could be accomplished through a boundary adjustment. Lands could be acquired through a variety of methods such as donation, transfer from any other federal agency, or exchange. (See appendix B for additional information on criteria for boundary modifications.)

PARTNERSHIPS

- The park staff would continue to have relationships with its partners. These partnerships include universities, colleges, schools, institutes, friends groups, and other organizations.
- Additional partnerships would be sought with city and county entities to make regional trail connections.
- Partnerships would be sought to develop an outdoor environmental education center at the south boundary of the Rincon Mountain District (in the vicinity of the Camino Loma Alta trailhead). This facility might not be developed if partnership funds were not available.

ESTIMATED COSTS

Costs for alternative 2 are given for comparison to other alternatives only; they are not to be used for budgetary purposes or implementation funding requests. Although the numbers appear to be absolutes, they represent a midpoint in a possible range of costs. The costs developed are total life-cycle costs, which are inclusive of all initial costs (new development, including transportation infrastructure costs, rehabilitation, and interpretive media), replacement costs, and recurring annual costs such as park site operations (see page 55).

All these costs are projected out for 25 years. They are shown as the worth in today's dollars. Life-cycle costs are explained in detail beginning on page 55. The initial capital cost for alternative 2 would be $9,299,500. The recurring annual costs would be $5,317,530. The maintenance or replacement costs would be $445,534. The total life-cycle cost for this alternative would be $15,062,564.

Note that these costs do not include the costs for the additional plans/ studies needed that are detailed near the end of this chapter.

Note also that actions directed by general management plans or in subsequent implementation plans are accomplished over time. Budget restrictions, requirements for additional data or regulatory compliance, and competing national park system priorities could prevent immediate implementation of many actions. Major or especially costly actions could be implemented 10 or more years into the future.

TABLE 5. ESTIMATED COSTS FOR ALTERNATIVE 2

Initial Capital Costs	$9,299,500
Annual Costs	$5,317,530
Replacement Costs	$ 445,534
Total Life Cycle Costs*	$15,062,564

*Includes capital costs, replacement costs, and annual costs

*calculated for 25 years at 7% discount rate

Range of Costs – based on cost engineering standard of -30%/+50% for order-of-magnitude estimates (AACE International Recommended Practice No. 18R-97, Figure 31a (ANSI Standard Z94.0). Example: Estimate of $1,000,000 has an accuracy range of $700,000 to $1,500,000.

ALTERNATIVE 3

CONCEPT

In alternative 3 the emphasis would be on providing a wider range of opportunities for visitors that is compatible with the preservation of park resources and its wilderness characteristics. Natural resources would be protected by relocating visitor activities now occurring in sensitive areas to areas that could withstand higher levels of visitation. Management efforts would focus on developing additional opportunities for visitors to enjoy and learn about the park. Visitors would have a variety of activities in easily reached areas of the park. Primitive visitor experiences would be available in the wilderness areas. Facilities would be expanded to provide additional support for visitor activities. (See alternative 3 maps.)

RATIONALE

This alternative concept was developed because the public wanted the park to expand programs and opportunities for a growing diverse population to experience and learn about the giant cactus and associated plants, animals, and landforms of the Sonoran Desert. In addition, the public expressed an interest in the park providing more diverse recreational opportunities, including trails for specific user groups. The public also felt that the park should plan for increased demands resulting from urban growth surrounding the park.

RESOURCE CONDITIONS

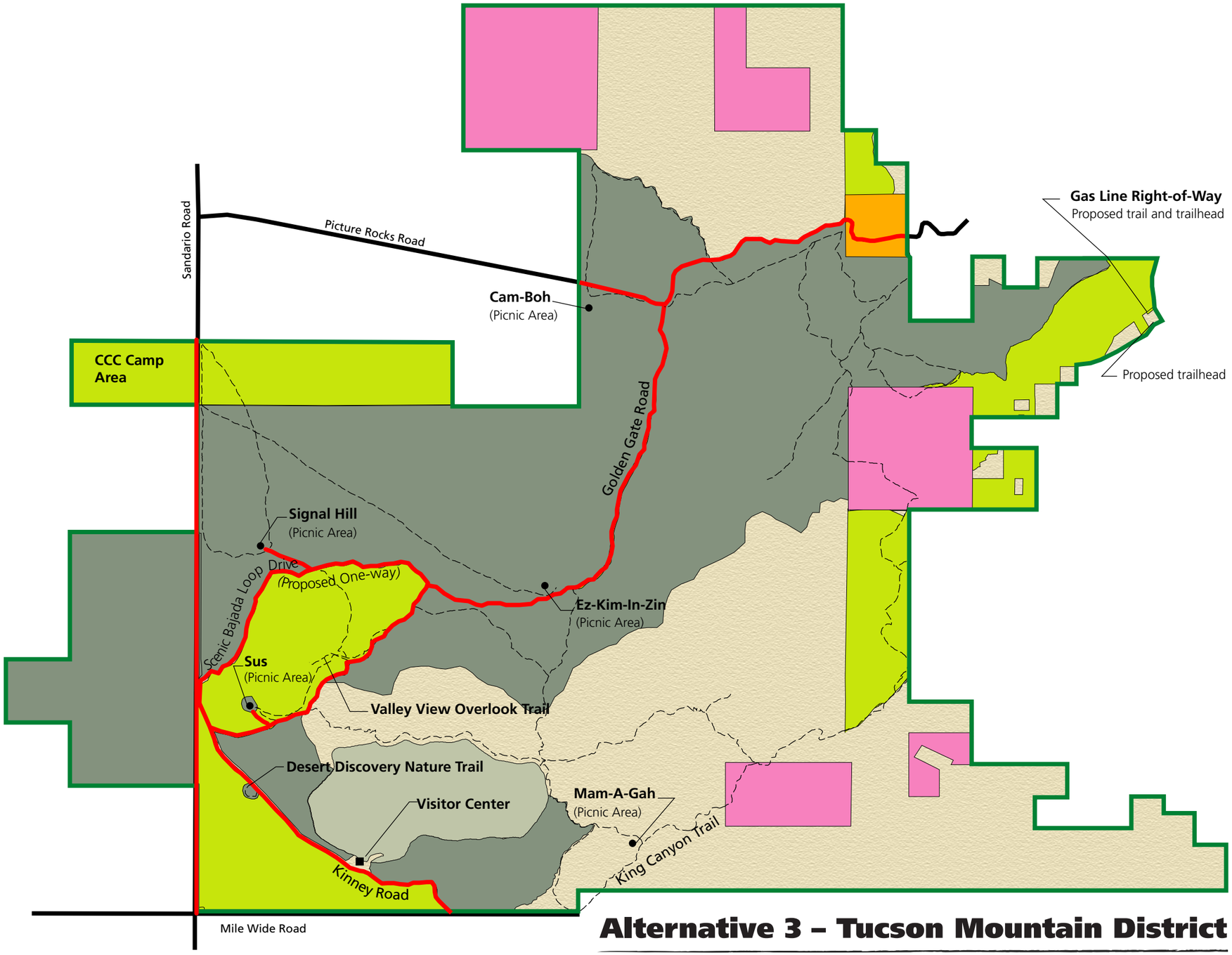
- Natural resource protection would remain a high priority for park management; however, some impacts could be acceptable to accommodate a diverse range of visitor opportunities and services.
- Cultural resources would be preserved and protected as described in the park-wide cultural resource management zone, including conducting inventories to identify and evaluate cultural resources and nominate appropriate sites to the National Register of Historic Places. Cultural resources that are on or eligible for the national register would be preserved and protected. Specifically, Cactus Forest Drive in the Rincon Mountain District, which was designed and built by the Civilian Conservation Corps (CCC), would continue as a sightseeing road, preserving its cultural landscape. In addition, the CCC camp area in the Tucson Mountain District would continue to be preserved, and a few trails with signs and wayside exhibits in the area could be added to facilitate and manage visitor access to the area.
- Occasional ranger-led tours to off-trail historic sites could also be provided.

ROADS

As in alternative 2, park staff would continue to monitor and mitigate wildlife mortality along road corridors in both districts. All roads in the park would be in the Sightseeing Corridor Zone. Additional compliance and public involvement would be done, if required, for the following actions.

Tucson Mountain District

- Golden Gate Road (between Ez-Kim-In-Zin picnic area and Picture Rocks Road), an internal park road, would remain open to vehicles and be in the Sightseeing Corridor Zone.



Legend

- PARK BOUNDARY
- TRAIL
- STATE LAND
- COUNTY LAND
- PRIVATE LAND

Management Zones

- SENSITIVE ZONE
- PRIMITIVE ZONE
- SEMI-PRIMITIVE ZONE
- NATURAL ZONE
- SIGHTSEEING CORRIDOR ZONE
- DEVELOPED ZONE

North

0 1 2 Miles

Alternative 3 – Tucson Mountain District

General Management Plan
Saguaro National Park

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DSC / May 2006 / 151 / 20061

Proposed Learning Center

Broadway Trailhead
Proposed improved trailhead

Douglas Spring Trailhead
Proposed improved trailhead

Wildhorse Trailhead
Proposed improved trailhead

Douglas Spring
(Camping Area)

Mica View
(Picnic Area)

Desert Ecology Trail

Spud Rock
(Camping Area)

Visitor Center and Parking
Proposed Visitor Center and parking expanded

Cactus Forest Drive

Park Headquarters and Staff Housing
Proposed move administrative facilities off-site

Grass Shack
(Camping Area)

Manning Camp
(Camping Area)
Proposed move fire and trail support facilities off-site

Juniper Basin
(Camping Area)

Javelina
(Picnic Area)

Freeman Homestead Trail

Camino Loma Alta Trailhead
Proposed trail and trailhead improvements

Madrona Area
Proposed visitor contact and science station

Happy Valley Saddle
(Camping Area)

Proposed Partnership Education Center

Legend

- PARK BOUNDARY
- TRAIL
- STATE LAND
- PRIVATE LAND

Management Zones

- SENSITIVE ZONE
- PRIMITIVE ZONE
- SEMI-PRIMITIVE ZONE
- NATURAL ZONE
- SIGHTSEEING CORRIDOR ZONE
- DEVELOPED ZONE

North

0 1 2 Miles

Alternative 3 – Rincon Mountain District

General Management Plan
Saguaro National Park

United States Department of the Interior • National Park Service
DSC / May 2006 / 151 / 20062

- As in alternative 2, the desired visitor experience and resource conditions (as outlined in the Sightseeing Corridor Zone) for Picture Rocks Road would be achieved by installing a potential range of traffic-calming strategies/ devices. These strategies/devices would begin at the least intrusive level. The park staff would then monitor visitor safety and resource conditions along the roads to determine if any additional road management applications were necessary. If additional devices/ strategies were still needed to achieve desired conditions, the next level of traffic calming would be applied. This process would continue until desired conditions were met. The process of continual monitoring and evaluating is known as adaptive management (see page 50.
- If additional management strategies do not sufficiently mitigate impacts to resources and visitor experiences, the park staff would then encourage and work with Pima County to develop other alternatives outside the park to using Picture Rocks Road.
- The two-way scenic Bajada Loop Drive, another internal park road, would be converted to a one-way, paved loop drive.

Rincon Mountain District

- The Cactus Forest Loop Drive would continue as a motor tour route and be placed in the Sightseeing Corridor Zone.

TRAILS

- If alternative 3 were selected as the approved management concept, the ongoing comprehensive trails plan would likely propose actions such as creating some hiking and biking opportunities with connections to regional trails in both districts, formalizing the Camino Loma Alta trailhead, and classifying some trails for hiker or equestrian use only. As in alternative 2, the comprehensive trails plan will recommend sustainable trail design and realignment/ rehabilitation.
- Alternative 3 contains the highest percentage of the Natural Zone, which does permit bicycles on trails designated for bicycle use.

Tucson Mountain District

- Opportunities for developing bicycling trails would be explored along the gas pipeline right-of-way near the eastern boundary of the district.
- Interpretive trails and signs would be considered on the land west of Sandario near the CCC camp.

Rincon Mountain District

- Biking opportunities would be explored along the Hope Camp Trail.
- The Camino Loma Alta trailhead would be improved.
- The Douglas Springs, Wildhorse, and Broadway trailheads would be redesigned/improved.
- Development of additional wheelchair accessible trails would be explored.

Trails in Both Districts

- Regional trail connections would be explored in conjunction with partners. The location of regional trail connections would be identified.
- The location of trail access points and possible trailheads would be identified.

MANAGEMENT OF MADRONA/ CHIMENEA AREA

- Existing infrastructure, including corrals, would be removed and replaced with a visitor contact station. The station would allow for daily ranger presence. By limiting access to one trail and providing daily ranger presence, the area's sensitive

riparian resources would continue to receive a high level of protection.
- A small science center would be placed at Madrona for research functions.
- The historic fireplace with chimney (chimenea) would be monitored and stabilized.
- The historic Civilian Aeronautical Administration building would be donated to an interested organization. If no interest was expressed, the structure would be documented and razed.

MANNING CAMP (RINCON MOUNTAIN DISTRICT)

- Fire crew and trail crew support facilities would be moved away from Manning Camp to a new off-site administration area if a suitable location was found. Support facilities to be removed would include the corrals, water system, propane equipment, and tent platforms. The vault toilet would remain for use by visitors using the backcountry camping area near Manning Camp.
- Temporary spike camps would be established by fire and trail crews when working in the backcountry.
- The recommendations of the *Manning Cabin Condition Assessment* (NPS 2005a) would be implemented to protect the cabin's historic fabric. These recommendations include rehabilitating and monitoring the cabin, reducing the amount of supplies and equipment stored inside, and moving propane tanks away from the exterior walls.
- Ranger presence would be maintained during the summer season for interpretation, law enforcement, initial fire response, and routine maintenance.

CAMPING

- Camping would continue to be permitted in the Rincon Mountain District above 4,500 feet. New campgrounds might also be developed in this area.

INTERPRETATION AND EDUCATION PROGRAMS

- The Rincon Mountain District visitor center would be expanded (2,200 to 3,200 square feet) to provide additional exhibit and office space. The Tucson Mountain District visitor center would remain the same.
- A learning center could be developed on the life estate property, and an existing park building could be rehabilitated for use as an education center.
- A partnership, outdoor, environmental education center could be developed at the south boundary of the Rincon Mountain District (in the vicinity of the Camino Loma Alta trailhead) to provide additional interpretive opportunities.
- A visitor contact station and science center would be developed in the Madrona area.
- Additional interpretive media (such as interpretive trails and waysides) and programs would be provided.

MANAGEMENT ACTIVITIES AND FACILITIES

- The Rincon Mountain District visitor center would be expanded (2,200 to 3,200 square feet), and some parking would be added to allow for additional visitor services.
- Staff operations at the Rincon Mountains District headquarters would be moved off-site if a suitable location were found. Existing headquarters building would be used as an education center. The annex building would be demolished.
- Staffing would be shared with partners if an outdoor education center was developed near Camino Loma Alta trailhead.

- A visitor contact and science center would be developed in the Madrona/Chimenea area for research functions.
- The facilities in the life estate property in the Rincon Mountain District would be used as a learning center.

BOUNDARY ADJUSTMENT

There would be no change to the current boundary.

PARTNERSHIPS

- The park would continue to have relationships with its partners. These partnerships include universities, colleges, schools, institutes, and friends groups.
- Partnerships would be sought with city, state, and federal entities to develop complementary interpretive programs and links to regional trails and shared visitor facilities, and to explore mutually beneficial mass transit options.
- Partnerships would be sought to develop an outdoor environmental education center at the south boundary of the Rincon Mountain District (in the vicinity of the Camino Loma Alta trailhead). This facility might not be developed if partnership funds were not available.

ESTIMATED COSTS

Costs for alternative 3 are given for comparison to other alternatives only; they are not to be used for budgetary purposes or implementation funding requests. Although the numbers appear to be absolutes, they represent a midpoint in a possible range of costs. The costs developed are total life-cycle costs, which are inclusive of all initial costs (new development, including transportation infrastructure costs, rehabilitation, and interpretive media), replacement costs, and recurring annual costs such as park operations (see page 55).

All these costs are projected out for 25 years. They are shown as the worth in today's dollars. Life-cycle costs are explained in detail beginning on page 55. The initial capital cost for alternative 3 would be $10,167,500. The recurring annual costs would be $6,622,038. The maintenance or replacement costs would be $511,310. The total life-cycle cost for this alternative would be $17,306,494.

Note that these costs do not include the costs for the additional plans/ studies needed that are detailed near the end of this chapter.

Note also that actions directed by general management plans or in subsequent implementation plans are accomplished over time. Budget restrictions, requirements for additional data or regulatory compliance, and competing national park system priorities could prevent immediate implementation of many actions. Major or especially costly actions could be implemented 10 or more years into the future.

TABLE 6. ESTIMATED COSTS FOR ALTERNATIVE 3

Initial Capital Costs	$10,167,500
Annual Costs	$ 6,622,038
Replacement Costs	$ 511,310
Total Life Cycle Costs*	$17,306,494

*Includes capital costs, replacement costs, and annual costs

*calculated for 25 years at 7% discount rate

Range of Costs – based on cost engineering standard of -30%/+50% for order-of-magnitude estimates (AACE International Recommended Practice No. 18R-97, Figure 31a (ANSI Standard Z94.0). Example: Estimate of $1,000,000 has an accuracy range of $700,000 to $1,500,000.

USER CAPACITY

As noted earlier, this management plan includes identification of user capacity indicators and standards. Table 7 includes the indicators, standards, related monitoring, and potential future management strategies, allocated by management zone that will be implemented as a result of this planning effort. These indicators and standards help translate the broader descriptions of desired conditions, which are qualitative, into something measurable. Measurable indicators have been selected for monitoring key aspects of visitor experiences and resources at Saguaro. Standards that represent the points where visitor experience and resource conditions become unacceptable in each zone were then assigned based on desired conditions. The indicators will be monitored in each zone, and when necessary, management actions will be taken to ensure that visitor use and resource impacts remain within the established standards.

The park staff considered many potential resource indicators that would identify visitor use impacts of concern, but many were eliminated because they were inefficient to monitor or did not provide adequate information on the issue. The resource indicators selected for Saguaro relate to the topics of trail width and use levels at the Madrona pools. These indicators were considered to be effective to monitor while also providing useful information about important resource impacts. Monitoring trail width helps identify the physical deterioration of trails, which is often related to overuse and crowding (e.g., people having to frequently step off the trail to pass others). Increasing the footprint of designated trails via expanding trail width detracts from the resource goals of the park and can also impact the visitor experience.

The Madrona pools contain highly sensitive resources that were considered to be most affected by the amount and frequency of use occurring directly adjacent to the pools, which may disturb the resting, feeding, mating, and migrating processes of native species. Therefore, the park staff will monitor the total number of people per month that are accessing the Madrona pools.

The park staff also considered many potential social or visitor experience indicators that would measure how visitor use levels, types, and behaviors were impacting other visitors. The social indicators selected relate to automobile speed on through-park roads and visitor encounter rates on trails. One of the most frequently mentioned impacts on visitor experiences in the Tucson Mountain District was related to speeding on Picture Rocks Road, resulting in the proposal of traffic calming as part of this general management plan. The park will monitor speed levels on Picture Rocks Road to gauge the success of the proposed traffic-calming strategies, and identify if additional traffic-calming strategies are needed in the future. The other social indicator was related to visitor encounter rates on trails, which has been demonstrated throughout the national park system as an important indicator of crowding and associated impacts on the visitor experience, especially in wilderness areas.

The standards selected for each indicator were based on best professional management judgment that was informed by the general management plan's desired conditions, the park's baseline conditions for each indicator, relevant park-specific and national research studies, and NPS guidelines and standards. The standards for the social/visitor experience indicators include probabilities (e.g., conditions can be out of standard 15% of the time) to account for the complexity and randomness inherent in visitor use patterns.

The park will continue general monitoring of use levels and patterns. In addition, the park will begin monitoring the following user capacity indicators. The rigor of monitoring (e.g., frequency of monitoring cycles, amount of geographic area monitored) the indicators may vary considerably depending on how close existing conditions are to the standards. If the existing conditions are far from exceeding the standard, the rigor of monitoring may be less than if the existing conditions are close to or trending towards the standards.

In addition, the initial phases of monitoring the indicators/standards will help the NPS identify if any revisions are needed. The initial testing of the indicators and standards will determine if the indicators are accurately measuring the conditions of concern and that the standards truly represent the minimally acceptable condition of the indicator. Park staff may decide to modify the indicators or standards and revise the monitoring program if better ways are found to measure changes caused by public use, if the indicators do not prove to be cost-effective to check regularly, or if the standards seem unrealistic to maintain. Most of these types of changes should be made within the first several years of initiating monitoring. This iterative learning and refining process is the strength of the NPS user capacity management program, in that it can be adapted and improved as knowledge grows.

After this initial testing period of monitoring indicators and standards, adjustments should not occur unless there is a compelling reason. Park staff need to be cautious of adjusting indicators and standards to a point where the indicators and standards are no longer consistent with the desired conditions for the zone. If desired conditions and subsequently indicators and standards need to be changed, it is likely these decisions will be subject to additional compliance.

Finally, if use levels and patterns change appreciably, the park may need to initiate additional monitoring of new indicators to ensure that desired conditions are protected. Some of the potential future user capacity indicators may relate to the topics of user-created trails that intersect with select sections of the park boundary, area of disturbance in select frontcountry areas, vandalism/theft of resources, trail erosion, mountain biking on unauthorized trails, unauthorized camping, use-conflicts on the park loop drives, and road kill on thru-park roads, among others. The selection of any new indicators and standards for monitoring purposes, changes to the indicators and standards identified in this general management plan, or the implementation of any management actions that affect use will comply with the National Environmental Policy Act, the National Historic Preservation Act, and other laws, regulations and policies as needed. The National Park Service would also inform the public of progress and proposed revisions to indicators and standards through regular reporting on the user capacity program.

TABLE 7. INDICATORS AND STANDARDS FOR EACH MANAGEMENT ZONE

Management Zone	User Capacity Indicators	User Capacity Standards	Related Monitoring Strategies	Potential Management Strategies
Sensitive Resource Protection Zone	1. Number of people per month at the Madrona Pools (measured in person-days)	1. No more than 90 people in any given month for at least 11 out of 12 months of the year	1. Periodic monitoring via trail counters or other counter technology	1. Reallocation of use (e.g., permitting or reservation system); Education (e.g., educate regarding resource sensitivity and need for appropriate behaviors); Site management (e.g., realignment of trails, physical barriers); Enforcement (e.g., provide signs, increase law enforcement presence, sanctions)
Primitive Zone	1. Mean trail width* for Type B and C trails 2. Number of groups encountered per day (6 hours) along designated trails	1. Mean trail width will not exceed 36 inches 2. No more than 7 groups encountered per day (6 hours) along designated trails, with 15% of observations allowed to exceed the encounter levels without violating the standard	1. Point sampling method as developed and applied by the Inventory & Monitoring Program 2. Periodic monitoring by park staff and volunteer observations of select trail segments. Monitoring will be initiated at least 0.5 mile from the trailheads to allow for higher encounters at the immediate entrance and exit to the trails.	1. Education (e.g., educate regarding resource sensitivity and need for appropriate behaviors); Site management (e.g., trail maintenance, realignment of trails); Reallocation of use (e.g., visitor permitting system) 2. Education (e.g., encourage voluntary redistribution of use); Site management(e.g., resize parking lot/access points, alter trail opportunities); Reallocation of use (e.g., institute a permitting or reservation system); Regulations (e.g., limit group sizes)
Semi-Primitive Zone	1. Mean trail width* for Type B and C trails 2. Number of people encountered every two hours along designated trails	1. Mean trail width will not exceed 36 inches 2. No more than 10** people encountered every two hours along designated trails (except Douglas Spring Trail), with 15% of observations allowed to exceed the encounter levels without violating the standard.	1. Point sampling method as developed and applied by the Inventory & Monitoring Program 2. Periodic monitoring by park staff and volunteer observations of select trail segments. Monitoring will be initiated at least 0.5 mile from the trailheads to allow for higher encounters at the immediate entrance and exit to the trails.	1. Education (e.g., educate regarding resource sensitivity and need for appropriate behaviors); Site management (e.g., trail maintenance, realignment of trails); Reallocation of use (e.g., visitor permitting system) 2. Education (e.g., encourage voluntary redistribution of use); Site management(e.g., resize parking lot/access points, alter trail opportunities, create single-use or one-way trails); Reallocation of use (e.g., institute a permitting or reservation system); Regulations (e.g., limit group sizes)
Natural Zone	1. Mean trail width*for Type B and C trails 2. Number of people encountered per hour along designated trails	1. Mean trail width will not exceed 36 inches 2. No more than 45 people encountered per hour along designated trails, with 15% of observations allowed to exceed the encounter levels without violating the standard.	1. Point sampling method as developed and applied by the Inventory & Monitoring Program 2. Periodic monitoring by park staff and volunteer observations of select trail segments	1. Education (e.g., educate regarding resource sensitivity and need for appropriate behaviors); Site management (e.g., trail maintenance, realignment of trails); Reallocation of use (e.g., visitor permitting system) 2. Education (e.g., encourage voluntary redistribution of use); Site management(e.g., resize parking lot/access points, alter trail opportunities, create single-use or one-way trails); Reallocation of use (e.g., institute a permitting or reservation system); Regulations (e.g., limit group sizes)
Sightseeing Corridor Zone	1. Percent of autos above the posted speed limit on Picture Rocks Road	1. No more than 15% of autos above the posted speed limit	1. Periodic monitoring with speed data collection technology	1. Education (e.g., public awareness campaign); Enforcement (e.g., signs, increase law enforcement presence, sanctions); Site management (e.g., change in traffic calming strategies)
Developed Zone	N/A – User capacity managed by facility capacities.	N/A – User capacity managed by facility capacities	Sufficiency of facility capacities will continue to be monitored	Future planning will address conflicts between facility capacity deficiencies and maintaining desired resource conditions and visitor experiences

* Trail width is defined as the most pronounced outer boundary of visually obvious human disturbance created by trail use – the area that receives the majority (>95%) of traffic

** Due to the high volume of use on Douglas Spring Trail because of its location and the attraction of Bridal Wreath Falls, the Douglas Spring Trail will have a different standard than the other trails in the semi-primitive zone. The standard will be "No more than 30 people encountered every hour along the trail, with 15% of observations allowed to exceed the encounter levels without violating the standard."

MITIGATIVE MEASURES COMMON TO ALL ACTION ALTERNATIVES

Congress charged the National Park Service with managing the lands under its stewardship "in such manner and by such means as will leave them unimpaired for the enjoyment of future generations" (NPS Organic Act, 16 USC 1). As a result, the National Park Service routinely evaluates and implements mitigation whenever conditions occur that could adversely affect the sustainability of national park system resources.

To ensure that implementation of the action alternatives protects natural and cultural resources and the quality of the visitor experience, a consistent set of mitigative measures would be applied to actions proposed in this plan. The National Park Service would prepare appropriate environmental review (i.e., those required by the National Environmental Policy Act, National Historic Preservation Act, and other relevant legislation) for these future actions. As part of the environmental review, the National Park Service would avoid, minimize, and mitigate adverse impacts when practicable. The implementation of a compliance-monitoring program would be considered to stay within the parameters of National Environmental Policy Act and National Historic Preservation Act compliance documents, U.S. Army Corps of Engineers Section 404 permits, etc. The compliance-monitoring program would oversee these mitigative measures and would include reporting protocols.

The following mitigative measures and best management practices would be applied to avoid or minimize potential impacts from implementation of the alternatives. These measures would apply to all alternatives.

CULTURAL RESOURCES

The National Park Service would preserve and protect, to the greatest extent possible, resources that reflect human occupation of Saguaro National Park. Specific mitigative measures include the following:

- Continue to develop inventories for and oversee research about archeological, historic, and ethnographic resources to better understand and manage the resources, including historic cultural and ethnographic landscapes. Conduct any needed archeological or other resource specific surveys, national register evaluations, and identify recommended treatments. Incorporate the results of these efforts into site-specific planning and compliance documents. Continue to manage cultural resources and collections following federal regulations and NPS guidelines and the NPS *Museum Collection Facilities Strategy, Intermountain Region* (NPS 2005d). Inventory the park's collection and keep in a manner that would meet NPS curatorial standards.
- Subject projects to site-specific planning and compliance procedures. For archeological resources, by locating projects and designing facilities in previously disturbed or existing developed areas, make efforts to avoid resources and thus adverse impacts through use of the *Secretary of the Interior's Standards for Archeology and Historic Preservation.* Use screening and/or sensitive design that would be compatible with historic resources and cultural landscapes and not adjacent to ethnographic resources. If adverse impacts could not be avoided, mitigate these impacts through a consultation process with all interested parties.

- Conduct archeological site monitoring and routine protection. Conduct data recovery excavations at archeological sites threatened with destruction, where protection or site avoidance during design and construction is infeasible. Strictly adhere to NPS standards and guidelines on the display and care of artifacts. This would include artifacts used in exhibits in the visitor center. Irreplaceable items would be kept above the 500-year floodplain.
- Mitigative measures for structures and landscapes include documentation according to standards of the Historic American Buildings Survey/Historic American Engineering Record/Historic American Landscape Survey (HABS/HAER/HALS). The level of this documentation, which includes photography, archeological data recovery, and/or a narrative history, would depend on significance (national, state, or local) and individual attributes (an individually significant structure, individual elements of a cultural landscape, etc.) and be determined in consultation with the state historic preservation officer. When demolition of a historic structure is proposed, architectural elements and objects may be salvaged for reuse in rehabilitating similar structures, or they may be added to the park's museum collection. In addition, the historical alteration of the human environment and reasons for that alteration would be interpreted to national park visitors.
- Continue ongoing consultations with culturally associated American Indian tribes. Protect sensitive traditional use areas to the extent feasible by avoiding or mitigating impacts on ethnographic resources and continuing to provide access to traditional use and spiritual areas. Mitigation could include identification of and assistance in accessing alternative resource gathering areas and screening new development from traditional use areas.
- Encourage visitors through the park's interpretive programs to respect and leave undisturbed any inadvertently encountered archeological resources as well as to respect and leave undisturbed any offerings placed by American Indians.

NATURAL RESOURCES

Air Quality

- Implement a dust abatement program during construction activities. Standard dust abatement measures could include the following elements: water or otherwise stabilize soils, cover haul trucks, employ speed limits on unpaved roads, minimize vegetation clearing, and revegetate after construction.

Exotic Plant Species

- Implement an exotic plants control program during construction activities. Standard measures could include the following elements: ensure construction-related equipment arrives on-site free of mud or seed-bearing material, certify all seeds and straw material as weed-free, identify areas of noxious weeds pre-construction, treat noxious weeds or noxious weed topsoil before construction (e.g., topsoil segregation, storage, herbicide treatment), and revegetate with appropriate native species.

Soundscapes

The park staff would work with local airport, Davis-Monthan Air Force Base, and Federal Aviation Administration and authorities to minimize the impacts on the park due to a change in flight paths or number of flights over and near the park.

Soils

- Build new facilities on soils suitable for development. Minimize soil erosion by limiting the time that soil is left exposed and by applying erosion control measures, such as erosion matting, silt fencing, and sedimentation basins in construction areas to reduce erosion, surface scouring, and discharge to water bodies. Once work was completed, revegetate construction areas with native plants in a timely period.
- Place construction equipment in previously disturbed areas.
- Locate trails on soils with low erosion hazards small changes in slope, and develop proper signs to minimize social trails.
- Ensure proper drainage of parking areas.

Threatened and Endangered Species and Species of Concern

Mitigative actions would occur during normal park operations as well as before, during, and after construction to minimize immediate and long-term impacts on rare, threatened, and endangered species. These actions would vary by specific project and area of the national park affected, and additional mitigations will be added depending on the specific action and location. Many of the measures listed below for vegetation and wildlife would also benefit rare, threatened, and endangered species by helping to preserve habitat. Mitigative actions specific to rare, threatened, and endangered species would include the following:

- Conduct surveys for rare, threatened, and endangered species as warranted.
- Locate and design facilities/actions to avoid adverse effects on rare, threatened, and endangered species. If avoidance is infeasible, minimize and compensate for adverse effects on rare, threatened, and endangered species as appropriate and in consultation with the appropriate resource agencies. Conduct work outside of critical periods for the specific species.
- Develop and implement restoration and/or monitoring plans as warranted. Plans should include methods for implementation, performance standards, monitoring criteria, and adaptive management techniques.
- Implement measures to reduce adverse effects of nonnative plants and wildlife on rare, threatened, and endangered species.

Vegetation

- Monitor areas used by visitors (e.g., trails) for signs of native vegetation disturbance. Use public education, revegetation of disturbed areas with native plants, erosion control measures, and barriers to control potential impacts on plants from trail erosion or social trailing.
- Use barriers and closures to prevent trampling and loss of riparian vegetation.
- Develop revegetation plans for areas disturbed by construction or unauthorized visitor use and require the use of native species. Revegetation plans should specify seed/plant source, seed/plant mixes, soil preparation, etc. Salvage vegetation from construction activities should be used to the extent possible.
- Include revegetation of work areas for the construction of the new segment of the scenic Bajada Loop Drive in alternative 2.
- In alternative 2, site spike camps away from locations with sensitive plants, and minimize how often work crews reuse the same area.

Water Resources

- To prevent water pollution during construction, use erosion control measures, minimize discharge to water bodies and washes, and regularly inspect construction equipment for leaks of petroleum and other chemicals. Minimize the use of heavy equipment in washes.
- Build a runoff filtration system to minimize water pollution from larger parking areas.
- Parking area designs should include ways to minimize damage from runoff. These could include having the parking area be a detention basin, could have runoff filtration, and/or could be sighted away from washes.

Wildlife

- Employ techniques to reduce impacts on wildlife, including visitor education programs, restrictions on visitor activities, and park ranger patrols.
- Implement a natural resource protection program during construction activities. Standard measures would include construction scheduling, biological monitoring, erosion and sediment control, the use of fencing or other means to protect sensitive resources adjacent to construction, the removal of all food-related items or rubbish, topsoil salvage, and revegetation. This could include specific construction monitoring by resource specialists as well as treatment and reporting procedures.

Wetlands

Delineate wetlands and apply protection measures during construction. Wetlands would be delineated by qualified NPS staff or certified wetland specialists and clearly marked before construction work. Perform construction activities in a cautious manner to prevent damage caused by equipment, erosion, siltation, etc.

VISITOR SAFETY AND EXPERIENCES

- Implement a traffic control plan, as warranted. Standard measures include strategies to maintain safe and efficient traffic flow during any construction period.
- Implement measures to reduce adverse effects of construction on visitor safety and experience.
- Consider accessibility in each project to understand barriers to programs and facilities. Provide the maximum level of accessibility.
- Implement adaptive visitor use management, as outlined in the user capacity section of this plan, when resource and visitor experience conditions are trending towards or violating a user capacity standard. Management strategies may include visitor education, site management, visitor use regulations, rationing or reallocation of visitor use, and enforcement.

HAZARDOUS MATERIALS

Implement a spill prevention and pollution control program for hazardous materials. Standard measures could include hazardous materials storage and handling procedures; spill containment, cleanup, and reporting procedures; and limitation of refueling and other hazardous activities to upland/ nonsensitive sites.

NOISE ABATEMENT

Mitigative measures would be applied to protect the natural sounds in the national park. Specific mitigative measures include the following:

- Implement standard noise abatement measures during construction. Standard noise abatement measures could include the following elements: a schedule that minimizes impacts on adjacent noise-sensitive uses, the use of the best available noise control techniques wherever feasible, the use of hydraulically or electrically powered impact tools when feasible, and the location of stationary noise sources as far from sensitive uses as possible.
- Implement standard noise abatement measures during park operations. Standard noise abatement measures could include the following elements: a schedule that minimizes impacts on adjacent noise-sensitive uses, use of the best available noise control techniques wherever feasible, use of hydraulically or electrically powered impact tools when feasible, and location of stationary noise sources as far from sensitive uses as possible.
- Site and design facilities to minimize objectionable noise.
- Work with Pima County and local communities to find ways to minimize the noise from construction and other urban activities.
- Construct and use traffic-calming devices and strategies to reduce vehicle noise in the park.

SCENIC RESOURCES

Mitigative measures are designed to minimize visual intrusions. These include the following:

- Where appropriate, use facilities such as fences to route people away from sensitive natural and cultural resources, while still permitting access to important viewpoints.
- Design, site and construct facilities to avoid or minimize adverse effects on natural and cultural resources and visual intrusion into the natural and/or cultural landscape.
- Provide vegetative screening, where appropriate.

SOCIOECONOMIC ENVIRONMENT

During the future planning and implementation of the approved management plan for Saguaro National Park, the National Park Service would work with local communities and county governments to further identify potential impacts and mitigative measures that would best serve the interests and concerns of both the National Park Service and the local and regional communities. Partnerships would be pursued to improve the quality and diversity of community amenities and services.

SUSTAINABLE DESIGN AND AESTHETICS

Projects would avoid or minimize adverse impacts on natural and cultural resources. Development projects (e.g., buildings, facilities, utilities, roads, bridges, trails, etc.) or reconstruction projects (e.g., road reconstruction, building rehabilitation, utility upgrade, etc.) would be designed to work in harmony with the surroundings, particularly to blend with its natural surroundings. Projects would reduce, minimize, or eliminate air and water nonpoint-source pollution. Projects would be sustainable whenever practicable, by recycling and reusing materials, by minimizing materials, by minimizing energy consumption during the project, and by minimizing energy consumption throughout the lifespan of the project.

FUTURE STUDIES AND IMPLEMENTATION PLANS NEEDED

After completion and approval of a general management plan for managing the national park, other more detailed studies and plans would be needed for implementation of specific actions. As required, additional environmental compliance (National Environmental Policy Act, National Historic Preservation Act, and other relevant laws and policies), and public involvement, would be conducted. Those additional studies include but would not be limited to the following:

- a wilderness study on the expansion areas found suitable for designation
- fire management plan
- resource conditions indicators — to effectively monitor wildlife and vegetation
- if any are found to be affected, a cultural landscape inventory would be needed for potential cultural landscapes listed in "Chapter 3: Affected Environment" under "Cultural Resources"
- trails plan to address site-specific issues related to trails and trail management
- comprehensive interpretive plan
- additional plan to evaluate traffic impacts of proposed adaptive management on Picture Rocks Road
- resource stewardship strategy

ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferable alternative is defined as the alternative that will promote the national environmental policy as expressed in section 101 of the National Environmental Policy Act. That section indicates that it is the continuing responsibility of the federal government to do the following:

1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations
2. Ensure safe, healthful, productive, and esthetically and culturally pleasing surroundings for all Americans
3. Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences
4. Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and a variety of individual choices
5. Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities
6. Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources

A description of how each alternative would or would not achieve the requirements of sections 101 and 102(1) of the National Environmental Policy Act is shown in table 8. Although all the alternatives in this plan rated well, elements that were not environmentally sound were eliminated from consideration.

Three of the above goals did not make a difference in determining the environmentally preferred alternative. Goal 1 is satisfied by all of the alternatives. Saguaro National Park is a unit of the national park system and as the trustee of this area the National Park Service would continue to fulfill its obligation to protect this area for future generations. All the alternatives would fulfill goal 2, ensuring safe, healthful, productive, and culturally pleasing surroundings for all Americans. Goal 6 is enhance the quality of renewable resources and maximize the recycling of depletable resources. All of the alternative would result in enhancing the quality of the renewable resources through NPS management.

The environmentally preferable alternative for Saguaro National Park's *General Management Plan / Environmental Impact Statement* is alternative 2, the preferred alternative by the National Park Service. Alternative 2 would surpass the other alternatives in realizing the full range of national environmental policy goals as described in section 101. In particular, the preferred alternative attains the widest range of beneficial uses without degradation (goal 3); preserves natural and cultural resources while providing a diversity and a variety of individual choices (goal 4); and achieves a balance between population and resource use (goal 5). Alternative 3 is similar to alternative 2 in its provisions for beneficial use, balance of population and resource use, and quality of renewable resources. However, it would not provide the strongest protection of natural and cultural resources. Thus, alternative 3 would not meet policy goal 4 as well as alternative 2.

Alternative 1 would similarly protect resources as do alternatives 2 and 3. However alternative 1 would restrict access to visitors, would restrict visitor choices, and would not achieve a balance (goals 3, 4, and 5) as well as alternative 2. Alternative 1 would not provide the balance between resource protection and providing a high standard visitor experience.

The balance of resource protection and the improvements to the visitor experience provided by alternative 2 would result in fully meeting the goals of the National

Environmental Policy Act and therefore was chosen as the environmentally preferred alternative.

TABLE 8. ENVIRONMENTALLY PREFERRED ALTERNATIVE ANALYSIS

Criteria	Alternatives		
	1	**2**	**3**
Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations.	2	2	2
Ensure safe, healthful, productive, and aesthetically and culturally pleasing surroundings for all Americans.	2	2	2
Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences.	1	2	2
Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and a variety of individual choices.	1	2	1
Achieve a balance between population and resource use that will permit high standards of living and a wide sharing of life's amenities.	1	2	2
Enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources.	2	2	2
Total Points*	**9**	**12**	**11**

*The alternative that fully meets the criteria is given 2 points, 1 point to the alternative that somewhat meets the criteria, and 0 points if the alternative does not meet the criteria.

ALTERNATIVES AND ACTIONS CONSIDERED BUT DISMISSED FROM DETAILED EVALUATION

During the planning process for Saguaro National Park, alternative 4 was presented in the initial alternatives newsletter. Since this time, alternative 4 was dropped from the planning process, as explained below.

To avoid the duplication of proposed actions and to save associated costs, the once-considered alternative 4 was dismissed.

DISMISSAL OF ALTERNATIVE 4 — CONSIDERATIONS ABOUT NATURAL RESOURCES

The major actions that might affect natural resources have all been evaluated under another alternative. Keeping Golden Gate Road open to vehicles is evaluated under alternative 3. The traffic-calming options for Picture Rocks Road are assessed as part of alternative 3. Backcountry camping opportunities were the same as in the no-action alternative (1). Management of Madrona would be the same as in the no-action alternative. The management zones proposed for various areas are evaluated under alternatives 2 and 3. The actions proposed in alternative 4 were duplicative of actions evaluated under other alternatives in the general management plan.

DISMISSAL OF ALTERNATIVE 4 — CONSIDERATIONS ABOUT CULTURAL RESOURCES

For cultural resources, the general management plan calls for a cultural resources parkwide management zone that applies to cultural resources in all alternatives that are not specifically singled out for particular actions per alternative as in the Madrona area or at Manning Camp. Because the cultural resources parkwide management zone calls for (1) cultural resources that are on or eligible for inclusion in the National Register of Historic Places to be preserved and maintained and possibly adaptively used and (2) cultural resources potentially eligible for listing in the national register to continue to be evaluated for a formal determination of eligibility and possible nomination to the national register, treatment actions would be the same or similar in each alternative. In the process of evaluation, protection, and preservation, monitoring sensitive cultural resources, such as historic structures, prehistoric rock art, and archeological village sites and rock shelters, could result in documentation, stabilization, or hazard abatement. Required compliance with Section 106 of the National Historic Preservation Act would be met for all undertakings in all alternatives. Therefore, the cultural resources parkwide management zone under alternative 4 is duplicative and thus a sufficient reason to dismiss alternative 4 regarding cultural resources not particularly singled out per alternative.

For the Madrona area, the alternative 4 proposed action of removing all existing administrative facilities is duplicated as follows under alternatives 2 and 3. Alternative 2 removes existing structures similar to the complete removal of administrative facilities in alternative 4. But the difference between alternative 2 and alternative 4 is that there would be some replacement of structures in the former as with housing for park staff and new corrals. The proposed action would be the same in alternatives 2 and 4 to raze and remove the small historic Civilian Aeronautical Administration (CAA) building if a willing taker could not be found to accept the NPS offer of donating and relocating it. In alternative 3, a visitor contact and science station would be developed in the Madrona area for interpretation and research purposes,

but removal of the existing administrative facilities as in alternative 4 would occur.

OTHER REASONS TO DISMISS ALTERNATIVE 4

Alternative 4 also included the proposal of a tram to access some of the Rincon Mountain District's trailheads and the Cactus Forest Loop Drive. The tram concept was not well received by the public during review of the alternatives. The *Saguaro National Park Plan: Transportation Study* (David Evans and Associates 2006) showed that the costs of implementing this concept were extremely high and did not seem commensurate with the proposed benefits, especially in light of the lack of public support.

The lowest level of traffic calming devices on through-park roads was also considered in alternative 4. This component of alternative 4 is redundant to the preferred alternative, which begins with the lowest level of traffic calming needed to address current conflicts on through-park roads. As part of the alternatives 2 and 3, the National Park Service would take an adaptive management approach to traffic calming on through-park roads, with higher levels of traffic calming only being applied as needed based on the results of monitoring resource conditions and visitor experiences.

The Cactus Forest Trail system was placed in the Primitive Zone in alternative 4. Upon full consideration of the impacts of this proposal on visitor opportunities, this component of alternative 4 was considered infeasible due to the degree of visitor use restrictions that would be needed to achieve the desired conditions of the Primitive Zone.

TABLE 9. SUMMARY OF ALTERNATIVES

	ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – PREFERRED	ALTERNATIVE 3
Concept	The no-action alternative is a continuation of current management and trends. This alternative serves as a basis of comparison with the two action alternatives. The park would continue to be managed as it is today, with no major change in management direction.	In alternative 2 the emphasis would be on protecting the park's ecological processes and biological diversity by connecting wildlife and plant habitats. Management efforts would focus on creating connections between isolated wildlife habitats and corridors. Visitation would be managed and redirected, when necessary, to protect sensitive resources and minimize impacts on resources.	In alternative 3 the emphasis would be on providing a wider range of opportunities for visitors that is compatible with the preservation of park resources and its wilderness characteristics. Natural resources would be protected by relocating visitor activities now occurring in sensitive areas to areas that could withstand higher levels of visitation. Visitors would have a variety of activities in easily reached areas of the park.
Rationale		This alternative concept was developed because the biological diversity and ecological processes of the park are in danger. In addition, the public expressed concern that overuse of the park and increasing urbanization would threaten the park's qualities of solitude, quiet, and naturalness.	This alternative concept was developed because the public wanted the park to expand programs and opportunities for a growing diverse population. In addition, the public expressed an interest in the park providing more diverse recreational opportunities, including trails for specific user groups. The public also felt that the park should plan for increased demands resulting from urban growth surrounding the park.
Resource Conditions	Natural resources and processes would be preserved while accommodating a range of visitor uses and experiences. Fragmentation in habitats, corridors, and regional ecosystems would continue. Cultural resources would continue to be preserved, protected, and interpreted.	Primitive and Semi-primitive zones, which call for natural resources to be maintained in pristine to excellent condition, would make up the largest area of the park. Tolerance for resource modifications or degradation would be low, and preservation of wildlife habitat would be a major management focus in these zones. Park management would seek to reduce fragmentation of habitats and isolated wildlife corridors. Revegetation efforts would increase to improve habitat conditions. Cultural resources would be preserved and protected as described in the parkwide cultural resource management zone.	Natural resource protection would remain a high priority for park management; however, some impacts could be acceptable to accommodate a diverse range of visitor opportunities and services. Cultural resources would be preserved and protected as described in the parkwide cultural resource management zone.

	ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – PREFERRED	ALTERNATIVE 3
Roads	Multiple entrances to the Tucson Mountain District would continue to allow access for non-park visitors, resulting in excessive traffic, high speeds, and conflicts between commuters and park visitors. The existing road corridors would continue to be managed through traffic signs and ranger patrols. Traffic laws and regulations would continue to be enforced by park rangers at the current levels. Park management would continue to discourage visitors from traveling some Tucson Mountain District roads such as Picture Rocks Road and Sandario Road due to safety concerns caused by excessive commuter speeds and volume. Resource damage would continue along roadways. Staff would not control infestations of nonnative plants along roadways due to unsafe conditions caused by heavy traffic and excessive speeds.	Park staff would continue to monitor and mitigate wildlife mortality along road corridors in both districts. All roads in the park would be in the Sightseeing Corridor Zone except for Golden Gate Road, which would be in the Natural Zone. Additional compliance and public involvement would be done, if required, for the following actions. <u>Tucson Mountain District</u> • Golden Gate Road would be converted to a multiuse trail. • The desired visitor experience and resource conditions for Picture Rocks Road would be achieved by installing a potential range of traffic-calming strategies/devices. These strategies/devices would begin at the least intrusive level. The park staff would then monitor visitor safety and resource conditions along the roads to determine if any additional road management applications were necessary. If additional devices/strategies were still needed to achieve desired conditions, the next level of traffic calming would be applied. This adaptive management process would continue until desired conditions were met. • If additional management strategies do not sufficiently mitigate impacts to resources and visitor experiences, the park staff would then encourage and work with Pima County to develop other alternatives outside the park to using Picture Rocks Road.	As in alternative 2, park staff would continue to monitor and mitigate wildlife mortality along road corridors in both districts. All roads in the park would be in the Sightseeing Corridor Zone. Additional compliance and public involvement would be done, if required, for the following actions. <u>Tucson Mountain District</u> • Golden Gate Road would remain open to vehicles and would be in the Sightseeing Corridor Zone. • As in alternative 2, the desired visitor experience and resource conditions for Picture Rocks Road would be achieved by installing a potential range of traffic-calming strategies/devices. (See alternative 2 and page 50. • If additional management strategies do not sufficiently mitigate impacts to resources and visitor experiences, the park staff would then encourage and work with Pima County to develop other alternatives outside the park to using Picture Rocks Road. • The two-way scenic Bajada Loop Drive, another internal park road, would be converted to a one-way, paved loop drive. <u>Rincon Mountain District</u> • The Cactus Forest Loop Drive would continue as a motor tour route.

	ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – PREFERRED	ALTERNATIVE 3
Roads (cont.)		• The scenic Bajada Loop Drive would be redesigned into a narrower, paved, one-way scenic loop. A new section of this loop drive would be built to move park traffic off Sandario Road. <u>Rincon Mountain District</u> • The Cactus Forest Loop Drive would continue as a motor tour route.	
Trails	The current Cactus Forest and Tucson Mountain District trail plans would guide trail management in the park. User conflicts, maintenance problems, duplicate/parallel trails, and resource damage would continue to be issues. Closure and revegetation of social trails would continue as recommended in the current trail plans. Biking would continue to be permitted on park roads and on the middle section of the Cactus Forest Trail. Biking would not be permitted on any additional trails. The Loma Alta trailhead to the Hope Camp, North Hope, and the Ridge View trails would remain informal. There would be limited opportunities to connect to regional trails outside park boundaries. There would be no new trailheads or trails developed.	<u>Tucson Mountain District</u> • Trailhead parking would be developed at both ends of the proposed Golden Gate Trail. • Opportunities for developing bicycling trails would be explored along Golden Gate Trail and the gas pipeline right-of-way near the eastern boundary of the district. Redesign of the Kings Canyon trailhead would be explored. • Development of new accessible paved trails, interpretive trails, and signs would be considered in the Natural Zone <u>Rincon Mountain District</u> • Biking opportunities would be explored along the Hope Camp Trail. • The Camino Loma Alta, Douglas Springs, Wildhorse, and Broadway trailheads would be redesigned/improved. • Development of additional ADA-accessible nature trails would be explored. <u>Trails in Both Districts</u> • The comprehensive trails plan will explore regional trail connections, locations of trail access points and trailheads, the need for single-use trails, and trail realignments.	<u>Tucson Mountain District</u> • Opportunities for developing bicycling trails would be explored along the gas pipeline right-of-way. • Interpretive trails and signs would be developed near the CCC camp. <u>Rincon Mountain District</u> • Biking opportunities would be explored along the Hope Camp Trail. • The Camino Loma Alta, Douglas Springs, Wildhorse, and Broadway trailheads would be redesigned/improved. • Development of additional ADA-accessible trails would be explored. <u>Trails in Both Districts</u> • The comprehensive trails plan will explore regional trail connections and locations of trail access points and possible trailheads

	ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – PREFERRED	ALTERNATIVE 3
Madrona/ Chimenea Area	Access to the Madrona/Chimenea area would continue to be limited. Visitors would need to travel several miles over difficult trails to access the area. The Civilian Aeronautical Administration building would remain and would be monitored. When funding permits, all other facilities would be removed as required by the state health department.	Visitor use at Madrona would continue to be highly regulated. The park would implement a limited permit system if further regulations on use levels were needed. The historic fireplace with chimney (chimenea) would be monitored and stabilized. The historic Civilian Aeronautical Administration building would be donated to an interested organization or documented and razed. Staff housing and new corrals would be developed. On-site staff would provide interpretation and information on resource protection.	Visitor use at Madrona would continue to be highly regulated by developing a visitor contact station. The station would allow for daily ranger presence. A small science center would be placed at Madrona for research functions. The historic fireplace with chimney (chimenea) would be monitored and stabilized. The historic Civilian Aeronautical Administration building would be donated to an interested organization or documented and razed.
Manning Camp	Current activities and facilities would remain.	Fire management and trail maintenance staging activities would be simplified. A comprehensive analysis would be conducted to identify the most efficient operation for fire and trail operational activities. The park staff would develop a shared work center/duty station with the U.S. Forest Service for initial fire response. Some administrative facilities would remain, such as the vault toilet, water system, corrals, and hitching posts. The number of tent platforms and propane equipment would be reduced. Seasonal spike camps would be set up for trail maintenance activities when these needs are a considerable distance from Manning Camp. The recommendations of the *Manning Cabin Condition Assessment* (NPS 2005a) would be implemented. Ranger presence would be maintained during the summer season for interpretation, law enforcement, initial fire response, and routine maintenance.	Fire and trail crew support facilities would be moved away from Manning Camp to a new off-site administration area. Support facilities to be removed would include the corrals, water system, propane equipment, and tent platforms. The vault toilet would remain for use by visitors using the backcountry camping area near Manning Camp. Temporary spike camps would be established by fire and trail crews when working in the backcountry. The recommendations of the *Manning Cabin Condition Assessment* (NPS 2005a) would be implemented. Ranger presence would be maintained during the summer season for interpretation, law enforcement, initial fire response, and routine maintenance.

Table 9: Summary of Alternatives

	ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – PREFERRED	ALTERNATIVE 3
Camping	Camping would continue to be permitted in the backcountry of the Rincon Mountain District. No additional campsites would be developed.	Camping opportunities in the Rincon Mountain District would take place in designated campsites, and camping would not be allowed in the Tucson Mountain District as is currently the case.	Camping would continue to be permitted in the Rincon Mountain District above 4,500 feet. New campgrounds might also be developed in this area.
Interpretation and Education Programs	The Rincon Mountain District visitor facility would remain at its current size, which would not meet the needs of a growing population, particularly a rapidly expanding school system. The interpretive displays in the Rincon Mountain District visitor center would remain outdated.	The Rincon Mountain District visitor center would be expanded (2,200 to 3,200 square feet) to provide additional exhibit and office space. The Tucson Mountain District visitor center would remain the same. An outdoor environmental education center could be developed near the Camino Loma Alta trailhead to provide additional interpretive opportunities A park structure would be reused as an education center when current uses are relocated. Additional opportunities for waysides and interpretive trails would be explored parkwide.	As in alternative 2, the Rincon Mountain District visitor center would be expanded (2,200 to 3,200 square feet) to provide additional exhibit and office space. The Tucson Mountain District visitor center would remain the same. A learning center (on the life estate property) and education center (rehabilitation of an existing park building) could be developed. A partnership, outdoor, environmental education center could be developed near the Camino Loma Alta trailhead. A science center and visitor contact station would be developed in the Madrona area. Additional interpretive media (such as interpretive trails and waysides) and programs would be provided.
Management Activities and Facilities	Facilities would remain at their current levels; staffing would not be increased. Administrative facilities in the Rincon Mountain District would remain inadequate. This district would remain too small to meet staff needs. This district would continue to serve local residents as its primary visitors. The Manning Camp area would continue to be used for fire crew activities. Facilities to support administration, such as the water supply system, the vault toilet, the historic cabin, the corral, and the tent cabins, would remain.	Expansion of the Rincon Mountain District visitor center (2,200 to 3,200 square feet) would allow for more efficient park operations. The annex would be removed when its administrative functions can be moved to other locations. Staffing would be shared with partners if an outdoor environmental education center was developed near Camino Loma Alta. An existing park building near park headquarters could be rehabilitated for use as an education center. State Trust, county, and private lands within park boundaries would be acquired from willing sellers when available and feasible. The facilities in the life estate property in the Rincon Mountain District would be used for NPS administrative purposes.	The Rincon Mountain District visitor center would be expanded (2,200 to 3,200 square feet), and some parking would be added to allow for additional visitor services. Staff operations at the Rincon Mountain District headquarters would be moved off-site if a suitable location were found. Existing headquarters building would be used as an education center. The annex building would be demolished. Staffing would be shared with partners if an outdoor education center was developed near the Camino Loma Alta trailhead. A visitor contact station and science center would be developed in the Madrona/ Chimenea area for research functions. The facilities in the life estate property in the Rincon Mountain District would be used as a learning center.

	ALTERNATIVE 1 – NO ACTION	ALTERNATIVE 2 – PREFERRED	ALTERNATIVE 3
Boundary Adjustment	There would be no changes to the current boundary.	Boundary adjustments would be recommended for protection of critical resources and values.	There would be no changes to the current boundary.
Partnerships	The park would continue to have relationships with its partners. These partnerships include universities, colleges, schools, the Rincon Institute, and friends groups.	The park staff would continue to have relationships with its partners. These partnerships include universities, colleges, schools, institutes, friends groups, and other organizations. Additional partnerships would be sought with city and county entities to make regional trail connections. Partnerships would be sought to develop an outdoor environmental education center at the south boundary of the Rincon Mountain District (in the vicinity of the Camino Loma Alta trailhead). This facility might not be developed if partnership funds were not available.	The park would continue to have relationships with its partners. These partnerships include universities, colleges, schools, institutes, and friends groups. Partnerships would be sought with city, state, and federal entities to develop complementary interpretive programs and links to regional trails and shared visitor facilities and to explore mutually beneficial mass transit options. Partnerships would be sought to develop an outdoor environmental education center at the south boundary of the Rincon Mountain District (in the vicinity of the Camino Loma Alta trailhead). This facility might not be developed if partnership funds were not available.
Costs			
Initial Capital Costs	$5,820,299	$9,299,500	$10,167,500
Annual Costs	$2,980,404	$5,317,530	$6,622,038
Replacement Costs	$291,760	$445,534	$511,310
Total Life-Cycle Costs (includes capital costs, replace-ment costs, and annual costs)	$9,092,463	$15,062,564	$17,306,494

TABLE 10. SUMMARY OF KEY IMPACTS OF IMPLEMENTING THE ALTERNATIVES

No impairment of park resources or values would result from implementing the alternatives.

	Alternative 1 – No Action	Alternative 2 – Preferred	Alternative 3
Impacts on Natural Resources			
Impacts on Vegetation	Most of the natural vegetation in Saguaro National Park would not be affected under alternative 1. Minor long-term adverse effects on vegetation in localized areas would continue to be caused primarily by visitor activities.	This alternative would have more potential for both beneficial and adverse effects in more areas of the park than alternative 1. The loss of native vegetation would be reduced by better protection and revegetation of disturbed areas. Alternative 2 would likely have a short-term, moderate and a long-term minor adverse impact in localized areas. Overall, most native vegetation in Saguaro National Park would continue to be protected and self-sustaining under alternative 2.	Most native vegetation in Saguaro National Park would continue to be protected and self-sustaining under alternative 3. Overall, alternative 3 would have short-term moderate and long-term minor adverse impacts on vegetation.
Impacts on Wildlife	Minor long-term adverse effects on park wildlife populations would continue under alternative 1 in local areas, primarily in developed areas, from the presence of visitors and staff.	Most wildlife populations and habitats in Saguaro National Park would continue to be protected and would not be changed by the actions proposed in this alternative. No actions would substantially affect areas that are known to be important for breeding, nesting, or foraging, or that are key migration routes. The proposals in alternative 2 would result in short-term moderate and long-term minor adverse effects on wildlife populations and habitats.	Most wildlife populations and habitats in Saguaro National Park would continue to be protected and would not be changed by the actions proposed in this alternative. Overall, alternative 3 would result in short-term moderate and long-term minor adverse effects on the park's wildlife populations and habitats.
Impacts on Threatened and Endangered Species and Species of Concern	Even with increased visitation, alternative 1 would not be likely to adversely affect the listed species in the park.	Before taking any action in alternative 2 that might affect federally listed species in the park, the National Park Service would consult with the U.S. Fish and Wildlife Service to ensure that potential impacts were identified and avoided. There is habitat for the cactus ferruginous pygmy-owl in the park. However, actions proposed in alternative 2 would not be likely to adversely affect the populations of lesser long-nosed bat, cactus ferruginous pygmy-owl, Mexican spotted owl, yellow-billed cuckoo, or Gila topminnow in Saguaro National Park.	Before taking any action in alternative 3 that might affect federally listed species in the park, the National Park Service would consult with the U.S. Fish and Wildlife Service to ensure that potential impacts were identified and avoided. There is habitat for the cactus ferruginous pygmy-owl in the park. However, actions proposed in alternative 3 would not be likely to adversely affect the populations of lesser long-nosed bat, cactus ferruginous pygmy-owl, Mexican spotted owl, yellow-billed cuckoo, or Gila topminnow in Saguaro National Park.

	Alternative 1 – No Action	Alternative 2 – Preferred	Alternative 3
Impacts on Soils	Alternative 1 would result in long-term minor adverse effects on soils in localized areas caused primarily by continued use of the park by visitors.	Most of the park's soils would not be affected by alternative 2. Overall, actions in alternative 2 would have short-term negligible and long-term minor adverse impact on localized portions of the park's soils.	Most of the park's soils would not be affected by alternative 3. Overall, actions in alternative 2 would have short-term minor and long-term moderate adverse impact on localized portions of the park's soils.
Impacts on Soundscapes	Most of Saguaro National Park would continue to be relatively quiet under alternative 1. However, there would continue to be long-term minor adverse effects on the park's soundscape in local areas, largely from visitation and administrative activities in developed areas.	The soundscape in most of Saguaro National Park would continue to be relatively quiet under alternative 2. Over the long term, there would be less sources of noise in the park than in alternative 1. The construction of traffic-calming devices on through-park roads, Rincon Mountain District visitor center and parking lot expansion, and other improvement projects would cause short-term moderate adverse effects on the soundscape, mostly in areas already exposed to some noise. Overall, alternative 2 would have a short-term moderate adverse effect on the noise level in localized areas and a long-term negligible adverse effect on the soundscape.	The soundscape in most of Saguaro National Park would continue to be relatively quiet under alternative 3. There would be more sources of noise in the park than in alternative 2 because Golden Gate Road would remain open to vehicular traffic. The construction of traffic-calming measures on through-park roads, Rincon Mountain District visitor center and parking lot expansion, and other improvement projects would cause short-term minor adverse effects on the soundscape, mostly in areas already exposed to some noise. The long-term adverse affects would be negligible.
Impacts on Cultural Resources			
Archeological Resources	Continued management actions under the no-action alternative would include no minimal new construction, and no new adverse impacts on archeological resources would be anticipated. In the event that impacts on national-register-eligible archeological resources could not be avoided, a memorandum of agreement, in accordance with 36 CFR Part 800.6, *Resolution of Adverse Effects*, would be negotiated between Saguaro National Park and the Arizona state historic preservation officer (and/or the Advisory Council on Historic Preservation, if necessary). The memorandum of agreement would stipulate how the adverse effects would be mitigated.	Avoidance of national-register-listed or -eligible archeological resources during the ground disturbances of trail and building construction would result in no adverse impacts on these resources. In the event disturbance of such archeological resources could not be avoided, a memorandum of agreement, in accordance with 36 CFR Part 800.6, *Resolution of Adverse Effects*, would be negotiated between Saguaro National Park and the Arizona state historic preservation officer (and/or the Advisory Council on Historic Preservation, if necessary). The memorandum of agreement would stipulate how the adverse effects would be mitigated.	Same as alternative 2.

	Alternative 1 – No Action	Alternative 2 – Preferred	Alternative 3
Cultural Landscapes	No adverse effects would be associated with revegetation of social trails because such rehabilitation would have a beneficial impact upon potential cultural landscapes by returning them to more of a semblance of their historic appearances in the natural setting of the Sonoran Desert. Continued management actions under the no-action alternative would include no new construction, and no adverse impacts on cultural landscapes would be anticipated. In the event that impacts on any national-register-eligible cultural landscapes could not be avoided, a memorandum of agreement, in accordance with 36 CFR Part 800.6, *Resolution of Adverse Effects*, would be negotiated between Saguaro National Park and the Arizona state historic preservation officer (and/or the Advisory Council on Historic Preservation, if necessary). The memorandum of agreement would stipulate how the adverse effects would be mitigated.	No adverse effects would be associated with revegetation of social trails because such rehabilitation would have a beneficial impact upon potential cultural landscapes by returning them to more of a semblance of their historic appearances in the natural setting of the Sonoran Desert. A site-specific study would take place if any potential cultural landscapes were to be affected by proposed actions of alternative 2, including national-register-listed or -eligible cultural landscapes, during trail and building construction activities; thus there would be no adverse impacts on these resources. In the event disturbance of such cultural landscapes could not be avoided, a memorandum of agreement, in accordance with 36 CFR Part 800.6, *Resolution of Adverse Effects*, would be negotiated between Saguaro National Park and the Arizona state historic preservation officer (and/or the Advisory Council on Historic Preservation, if necessary). The memorandum of agreement would stipulate how the adverse effects would be mitigated.	Same as alternative 2.
Ethnographic Resources	Implementing alternative 1 would impact adversely at a minor intensity level for the long term harvesting of saguaro fruit in the park area selected for this purpose as an ethnographic resource by the Tohono O'odham because high speed/high noise traffic would continue and would likely increase in this area. There would be a long-term minor beneficial impact from continuing the fruit-collecting practice in the park via permit.	Alternative 2, the preferred alternative, would impact beneficially and moderately for a long-term period the harvesting of saguaro fruit in the park's Tucson Mountain District. There would be no adverse effect on the area as a potential traditional cultural property.	Same as alternative 2.

	Alternative 1 – No Action	Alternative 2 – Preferred	Alternative 3
Historic Structures	There would be no adverse effect concerning the monitoring of the CAA building, and there would be an adverse effect with the continuation of existing fire management and trail maintenance operations on the historic fabric of Manning Cabin at Manning Camp. There would be no change regarding Manning Dam and no adverse effect.	There would be an adverse effect concerning relocating or razing the CAA building, and there would be no adverse effect with the simplification of the fire management and trail maintenance conditions on the historic fabric of Manning Cabin at Manning Camp. There would be no change regarding Manning Dam and no adverse effect.	There would be an adverse effect concerning relocating or razing the CAA building, and there would be no adverse effect with the moving away of the fire management and trail maintenance support facilities on the historic fabric of Manning Cabin at Manning Camp. There would be no change regarding Manning Dam and no adverse effect.
Impacts on Visitor Experience			
	Alternative 1 would result in major beneficial impacts from continued opportunities to participate in diverse recreational opportunities that bring visitors in close contact with one of the most interesting and unusual collections of desert life in the United States, including the highly valued opportunities for solitude and getting in touch with nature. However, minor to major adverse impacts on the visitor experience from user conflicts on trails, limited bicycling opportunities, increasing use in wilderness areas that may threaten visitors' opportunities for solitude, and increasing commuter traffic along through-park roads would continue.	Alternative 2 would result in moderate and major beneficial impacts resulting from enhanced protection of visitor experiences and recreational activities that are unique to the park, including outstanding primitive hiking and camping, opportunities for solitude and getting in touch with nature, and learning about the Sonoran Desert from an up-close perspective. In addition, the provision of new opportunities such as bicycling and educational programs would be a moderate beneficial impact on the range of recreational opportunities. Further, current adverse impacts from user conflicts on trails, increasing use in wilderness areas that may threaten visitors' opportunities for solitude, and increasing commuter traffic along through-park roads would be moderated via a variety of proposals that would improve the visitor experience in the park over the long term, resulting in moderate to major beneficial impacts.	Alternative 3 would result in moderate beneficial impacts resulting from more opportunities to participate in diverse recreation opportunities that bring visitors in close contact with unusual and interesting desert life. Further, current adverse impacts from user conflicts on trails, increasing use in wilderness areas that may threaten visitors' opportunities for solitude, and increasing commuting traffic along through-park roads would be moderated via a variety of proposals that would greatly improve the visitor experience in the park over the long term — long-term moderate to major beneficial impacts.

	Alternative 1 – No Action	Alternative 2 – Preferred	Alternative 3
Impacts on the Socioeconomic Environment			
	Moderate long-term adverse socioeconomic effects would occur with continued implementation of alternative 1, as the park may have difficulty maintaining its high standard of service while keeping pace with local and regional population growth and urban development. Without development of improved visitor experience and access, visitation might not increase proportionately with population and economic growth. In this case, the relative importance of the economic activity associated with the park in terms of visitor spending, sales, personal income, and jobs would decrease.	Implementation of alternative 2 would result in an overall moderate long-term beneficial effect on the socioeconomic environment. Management and enhancement of the visitor experience, while protecting natural resources, would encourage visitation to Saguaro National Park and would benefit the local community by increasing spending related to recreational activity and possibly extended stays. The emphasis on protection of sensitive resources and reduction of habitat fragmentation would also provide a moderate long-term beneficial effect by maintaining the park's naturalness and encouraging visitation. Improved traffic conditions along Picture Rocks Road through traffic-calming devices would likely encourage increased visitation and economically benefit the national park and the community through lower maintenance costs and increased visitation.	As with alternative 2, overall there would be a moderate long-term beneficial effect created by the actions proposed under alternative 3. Enhancement of the visitor experience would serve to encourage visitors to Saguaro National Park and the local community, creating a long-term economic benefit from tourism and recreational activities. Installation of traffic-calming measures would enhance the visitor experience and would diminish the risk of resource loss and threat to public safety. Financial benefit would be realized in the form of a minor decrease in maintenance and law enforcement costs.
Impacts on Transportation			
	Tucson Mountain District Congestion and safety problems on Picture Rocks Road could result in both visitors and non-visitors diverting to Twin Peaks and Kinney roads. Potential traffic diversion would have a long-term negligible beneficial effect for all users on Picture Rocks Road, Ina Road, and Wade Road, since these roads are nearing capacity. Long-term minor adverse effects to visitors and non-visitors would continue as a result of the confusing circulation pattern of the scenic Bajada Loop Drive.	Tucson Mountain District The conversion of Golden Gate Road to a trail would result in long-term, negligible adverse impact on visitors, since this road has minimal traffic now and any corresponding traffic diversion would be minimal. There would be a long-term, negligible adverse effect on non-visitor motorists due to some small amount of traffic diversion to other roads as described above. Conversion of the scenic Bajada Loop Drive/ Hohokam Road to a one-way loop with a new alignment off of Sandario Road would	Tucson Mountain District Keeping Golden Gate Road open to traffic would result in long-term, negligible, beneficial impact for visitors and non-visitors. Conversion of the scenic Bajada Loop Drive/ Hohokam Road to a one-way loop with a new alignment off of Sandario Road would have long-term, moderate beneficial impact to visitor and non-visitor motorists. The implementation of adaptive management approach to traffic calming on Picture Rocks Road to reduce speeding and accidents would result in short-term,

	Alternative 1 – No Action	Alternative 2 – Preferred	Alternative 3
	A continuation of current conditions at the Picture Rocks Road/Golden Gate Road intersection under alternative 1 would result in a long-term, major adverse impact to safety of visitors and non-visitor users. Non-visitor users would experience long-term, minor, adverse impacts to safety from the park's management of Picture Rocks Road. Having a portion of the scenic Bajada Loop Drive on Sandario Road would result in a long-term, moderate to major adverse impacts on visitors and non-visitor users because of the high accident rate on this section of Sandario Road. Alternative 1 would result in long-term, minor adverse impacts to parking for visitors and non-visitor users. Rincon Mountain District Alternative 1 would have long-term, negligible, adverse impacts on visitors, since the capacity exists to handle additional visitation and background growth with existing facilities and/or minimal changes to park operations. There would be a continuing long-term negligible adverse impact on visitor safety from occasional conflicts between pedestrians and traffic queues. Long-term, minor adverse impacts are anticipated due to a lack of parking.	have long-term, moderate beneficial impact on visitor and non-visitor motorists. The implementation of adaptive management approach to traffic calming on Picture Rocks Road to reduce speeding and accidents would result in short-term, moderate to major adverse impacts to non-visitor motorists due to increased travel time and/or the diversion of motorists to alternate routes described above until the Twin Peaks interchange is built. However the implementation of traffic-calming devices would result in long-term, moderate to major beneficial impact on park visitors due to providing a safer, more appropriate and leisurely park driving experience. The proposed new automobile and equestrian trailhead parking south of the Picture Rocks Road/Golden Gate Road intersection would result in long-term, minor beneficial impacts on visitors. Improving the intersection of Golden Gate Road/ Picture Rocks Road to provide safe access to the proposed parking area would result in long-term, moderate beneficial impacts on visitors. The addition of new parking would have a long-term negligible beneficial impact on non-visitor motorists by providing a designated safe parking area if needed. Rincon Mountain District There would be no long-term impacts to visitor circulation. Visitors may experience some short-term, negligible to minor adverse impacts while new parking is being constructed at the Golden Gate trailhead This alternative proposes to expand the	moderate to major adverse impacts to non-visitor motorists due to increased travel time and/or the diversion of motorists to alternate routes described above until the Twin Peaks interchange is built. However the implementation of traffic-calming devices would result in long-term, moderate to major beneficial impact to park visitors due to providing a safer, more appropriate and leisurely park driving experience. No safety improvements to the intersection of Golden Gate Road/ Picture Rocks Road would result in long-term, moderate adverse impacts on visitors and non-visitors. No additional parking on Golden Gate Road would result in long-term, minor adverse impacts to parking for visitors and long-term, negligible adverse impacts to non-visitor users. Rincon Mountain District Transportation impacts for alternative 3 would be identical to those described under alternative 2 for this district. Please refer to the transportation impact analysis for alternative 2 for this district.

	Alternative 1 – No Action	Alternative 2 – Preferred	Alternative 3
		visitor center parking lot. This would result in a long-term, minor beneficial impact to visitor safety. With the additional parking proposed for the Speedway and Broadway trailheads the lack of congestion would be a long-term moderate beneficial impact. However, non-visitor users may experience long-term, negligible adverse impacts due to some additional traffic on these roads en route to the parking areas. Expansion of the parking at the Wild horse and Douglas Springs trailheads and the Rincon visitor center is proposed in this alternative. There would some short-term, negligible to minor adverse impact during construction of parking; however, all the parking proposals would ultimately result in long-term, minor beneficial impacts to visitors as a result of additional parking capacity.	
Impacts on Park Operations and Facilities			
	Continuing the current trend in park staffing would likely result in an increasing inability to effectively meet demands on park operations due to steadily increasing visitation and traffic associated with non-visitors. This continued direction would create a long-term moderate adverse effect on park operations. Current law enforcement requirements to manage traffic along Picture Rocks Road and maintaining the Rincon Mountain District visitor center would create long-term major adverse impacts on park operations. Actions in alternative 1 that would create long-term moderate adverse impacts on park	Filling additional positions to meet the proposed actions described under alternative 2 would be expected to create long-term moderate beneficial effects on park staff engaged in activities such as protecting biodiversity and resource and visitor protection. Actions in alternative 2 that would create short-term moderate adverse impacts on park operations due to construction and implementation requirements include the installation of traffic-calming devices along Picture Rocks Road, the development of the partnership environmental education center, the conversion of Golden Gate Road to a trail, the construction of new parking areas,	The additional positions required to address expanded programs and opportunities for park visitors described under alternative 3 would be expected to result in long-term moderate beneficial effects on park operations by accommodating increased use. Actions that would create long-term moderate adverse effects on park operations would be the required ongoing maintenance of the Golden Gate Road, new trails, and possible new campsites. The lack of housing at Madrona, and long-term maintenance requirements for the new education centers, new exhibits, and a new vault toilet at the Camino Loma Alta

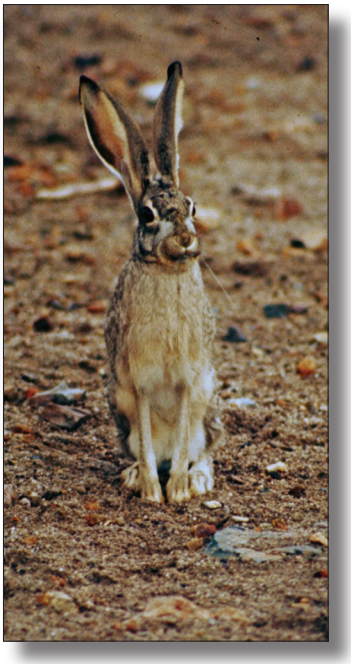
	Alternative 1 – No Action	Alternative 2 – Preferred	Alternative 3
	operations and facilities include continuing current management practices regarding trails and trailheads, parking areas, maintenance of the Golden Gate Road, the continuation of inadequate office space for park staff, the removal of the corral at Madrona, and monitoring the CAA building and stabilizing Manning Cabin. Outdated exhibits and lack of adequate information signs, and the removal of condemned park housing at Madrona with no replacement would create minor long-term adverse effects on park operations as a result of increased personal services required for visitors by park staff.	the removal of some facilities at Manning Camp, and the expansion of the Rincon Mountain visitor center with new exhibits. The relocation of park offices to a new facility would also constitute a short-term moderate adverse effect on park operations during this transition. There would be long term minor adverse effects as a result of increased maintenance required to service new exhibits, the removal of park housing and corral at Madrona and rebuilding the corral to minimize resource impacts, developing a larger Rincon Mountain visitor center, developing the partnership environmental education center, converted office space for use as an education center, and new trails proposed under this alternative. Actions in alternative 2 that would create long-term major beneficial impacts on park operations and facilities include improve-ments to trails and trailheads, the development of the partnership environmental education center, the conversion of Golden Gate Road to a trail, expansion of the Rincon Mountain District visitor center, construction of traffic-calming devices along the Picture Rocks Road, and development of adequate office space for park staff. Actions that would create long-term moderate beneficial effects on park operations and facilities include the removal and relocation of the CAA building, the removal and reconstruction of the corral and park housing at Madrona, the reduction of equipment and personnel at Manning Camp, and the new exhibits and other	Trailhead would all create long-term minor adverse effects on park operations. Actions that would create short-term moderate adverse impacts on park operations due to construction and implementation requirements include the installation of traffic-calming devices along Picture Rocks Road, the potential construction of new trails, and the expansion of the Rincon Mountain visitor center with new exhibits. The relocation of park offices to a new facility would also constitute a short-term moderate adverse effect on park operations during this transition. Actions that would create short-term minor adverse effects include the construction of new parking areas and the removal of the corral, park housing, and CAA building at Madrona. Actions that would create long-term major beneficial impacts on park operations and facilities would include improvements to trails and trailheads, expansion of the Rincon Mountain District visitor center, construction of traffic-calming devices along Picture Rocks Road, development of adequate office space for park staff, and construction of a visitor contact station and science station at Madrona and rehabilitation of existing facilities for learning and education centers. Actions that would create long-term moderate beneficial effects on park operations and facilities include the relocation or removal of the CAA building at Madrona, the removal of the corral and park housing at Madrona, and the new exhibits and interpretive media installed in the Rincon Mountain visitor center and at key

	Alternative 1 – No Action	Alternative 2 – Preferred	Alternative 3
		interpretive media installed in the Rincon Mountain visitor center and at key locations around the park. As long as increases in parking areas and availability are proportionate to user capacity thresholds for the park and this new development does not create a larger management problem in the long run as a result of increased use, it is expected that long-term effects would be minor beneficial under alternative 2.	locations around the park. The removal of nonhistoric facilities at Manning Camp would create long-term moderate beneficial effects on park operations. As long as increases in parking areas and availability were proportionate to user capacity thresholds for the park and this new development does not create a larger management problem in the long run as a result of increased use, it is expected that long-term effects would be minor beneficial under alternative 3.



3
Affected Environment





INTRODUCTION

This chapter describes the existing environment of Saguaro National Park and the surrounding region. It is focused on the park resources, uses, facilities, and socioeconomic characteristics that have the potential to be affected if any of the alternatives were implemented. Some features, such as floodplains and endangered species, are discussed because they provide context or must be considered in an environmental impact statement.

NATURAL RESOURCES

INTRODUCTION

This section describes the environmental, cultural, and social context for the alternatives introduced in Chapter 2. It describes only those resources that may experience impacts if the alternatives were implemented. Specific resources that would not be affected at a greater than minor level are listed in the impact topics dismissed section found in Chapter 1. The Council on Environmental Quality requires that NEPA documents "succinctly describe the environment of the area(s) to be affected or created by alternatives under consideration (1502.15)."

VEGETATION TYPES

Rincon Mountain District has low elevation Sonoran desertscrub that gives way upslope to desert grassland, which in turn intermixes with pine-oak woodland. Pine-oak woodland gives way to pine-oak forest, which gives way to pine forests, and with mixed conifer forests at higher elevations on north-facing slopes. The addition and loss of species from 3,000 to 8,600 feet is gradual, leading to many shared species between adjacent plant associations. Riparian forest and riparian woodland occur locally in canyon bottoms. Wet and dry meadows are found in scattered clearings at high elevations — the former around springs, the latter often on old burns and disturbed sites.

The Tucson Mountain District includes desertscrub, desert grassland, and desert riparian scrub plant associations, which exhibit many similarities to their counterparts in the Rincon Mountains. Higher elevation communities are absent because the highest point in the Tucson Mountains is 4,687 feet in elevation.

Sonoran Desertscrub — Rincon Mountain District

Sonoran desertscrub occurs from the base of the mountains to about 5,200 feet and is characterized by many cacti and by the drought-tolerant habitat of many of the deciduous trees and shrubs. Dominants in the overstory include foothills paloverde, saguaro, ocotillo, and velvet mesquite. Common understory plants include canyon ragweed, brittlebush, various cholla species, wolfberry, smoketree, barrel cactus, desert hackberry, creosote bush, fairy duster, whitethorn and catclaw acacia, prickly pear, and limberbush. Some of the most problematic exotic plants found in the desertscrub habitat in the park are red brome, filaree, Sahara mustard, Malta starthistle, fountain grass, and buffelgrass.

Sonoran Desertscrub — Tucson Mountain District

This vegetation type occurs throughout the Tucson Mountains from 2,130 to 4,687 feet. Foothills paloverde and saguaro cactus are the dominant species of this vegetation type. Cacti are particularly diverse in association with paloverde and saguaro, and include various chollas, prickly pears, barrels, hedgehog, and pincushion cactus. The most important of a diverse array of shrubs include creosote bush, jojoba, limberbush, ocotillo, brittlebush, and several bursages. Creosote bush and jojoba become dominant plants in some areas, often forming monospecific stands. As in the Rincon Mountain District, red brome, filaree, Sahara mustard, Malta starthistle, fountain grass, and buffelgrass are among the most problematic exotic species.

Desert Grassland —
Rincon Mountain District

Patches of grassland occur from 4,000 to 5,000 feet in elevation. This association, forming ecotones with pine-oak woodland at its upper edge and desertscrub at its lower edge, is characterized by the presence and dominance of numerous warm-season, perennial bunchgrasses. The most important grasses include various gramas, tanglehead, plains lovegrass, cane beardgrass, wolftail, curly mesquite, and Arizona cottontop, to name a few. Many shrubs and succulents occur in desert grassland, such as ocotillo, sotol, shin dagger, wait-a-minute bush, fairy duster, wild cotton, skeletonweed, brickellia, turpentine bush, and a diverse assemblage of cacti. Scattered trees include velvet mesquite, Mexican blue oak, and two species of juniper. Mesquite can occur as a dominant tree, especially where disturbance (i.e., grazing) has been heavy in the past. It is unclear if there are any "true" desert grasslands left at Saguaro National Park (i.e., large areas of open grass). The several small patches that exist are slowly being encroached upon by shrub and tree species. Problematic exotics present in this plant community include Lehmann's and Boer's lovegrasses. Lehmann's lovegrass has invaded thousands of acres of grassland in other natural areas in southern Arizona and is found in the park.

Desert Grassland —
Tucson Mountain District

Similar patches of desert grassland are found at elevations above the Sonoran desertscrub in the Tucson Mountains from 3,691 to 4,687 feet in elevation and usually include many desertscrub plants. Warm-season grasses include Arizona cottontop, curly mesquite, green sprangletop, plains lovegrass, and a number of gramas. Tanglehead is found in unusual profusion. Other important plants include banana yucca, shin dagger, sotol, turpentine bush, velvet mesquite, and wild buckwheat. The most serious invader of this association is Lehmann's lovegrass.

Pine-Oak Woodland —
Rincon Mountain District

Pine-oak woodland occurs from 4,400 to 6,100 feet in elevation. The woodland (also known as interior chaparral) describes a diverse, heterogeneous community type that ranges from near-100% cover stands of 20-foot-tall pines and evergreen oaks, to more open pinyon-juniper woodland, to chaparral-like stands of shrubby manzanita, silktassel, and lower-stature oak. Other important elements in the shrub layer include mountain yucca, beargrass, lemonade berry, shin dagger, and occasional succulents like cholla, prickly pear, and agave. The heterogeneous structure of this association contributes to its particularly high diversity of both forbs and grasses.

Pine-Oak Forest —
Rincon Mountain District

Pine-oak forest occurs from 5,300 to 8,000 feet in elevation. Pine-oak forest blends into pine forest at its upper elevational limit and into pine-oak woodland at its lower elevational limit. It can be distinguished from either of these vegetation types by the larger number of oak present and by the presence of Chihuahua pine. Tree height in pine-oak forest is intermediate between pine forest, where trees are typically greater than 80 feet tall, and pine-oak woodland, where trees are less than 20 feet tall.

Ponderosa Pine Forest —
Rincon Mountain District

This vegetation type occurs from 6,000 to 8,666 feet in elevation. Ponderosa pine is dominant in this association, sometimes forming pure stands in the Rincon Mountains. Southwestern white pine and Gambel's oak

are usually found as subdominants. The shrub layer is composed of scattered snowberry, mountain spray, Arizona honeysuckle, and Fendler's ceanothus.

Mixed-Conifer Forest — Rincon Mountain District

Mixed-conifer forest occurs on north-facing slopes from 7,000 to 8,666 feet in elevation. Douglas fir is the dominant species in the overstory, with ponderosa pine, southwestern white pine, Gambel's oak, New Mexico locust, and white fir as subdominants. The shrub understory consists of scattered patches of snowberry, mountain spray, Arizona honeysuckle, and raspberry.

Mixed in with these major vegetation types are the following vegetation communities:

Mountain Wet Meadow — Rincon Mountain District

Mountain wet meadow occurs near springs from 7,402 to 8,666 feet in elevation. Dominant species are largely various species of sedges, grasses, and rushes.

Mountain Dry Meadow — Rincon Mountain District

Mountain dry meadow occurs at 8,500 feet in elevation. Perennial grasses such as mountain muhly, fringed brome, and rough bentgrass dominate this association. Large stands of bracken fern also occur, usually with perennial western sneezeweed and a range of annual forbs and grasses. Disturbed stands of these ferns may be invaded by sheep sorrel, cheatgrass, and Kentucky bluegrass. Dry meadows in the Rincon Mountains may be of human or natural origin (e.g., logging or intense fire) and may revert to pine forest without further disturbance.

Riparian Woodland and Riparian Forest — Rincon Mountain District

Riparian forest occurs above 5,000 feet and is characterized by Arizona alder, boxelder, and coyote willow. Riparian woodland is highly variable in species composition, typically supporting not only riparian obligate species but also non-riparian species normally found at higher elevations. Dominant riparian-obligate trees include Arizona sycamore, Goodding's willow, velvet ash, Arizona walnut, and Fremont cottonwood. Representative trees and shrubs usually found at higher elevations include ponderosa and Chihuahua pine, silverleaf oak, New Mexico locust, lemonade berry, manzanita, beargrass, barberry, and California and hollyleaf buckthorn. Riparian forest and woodland support a diverse array of grasses, sedges, and rushes.

By their nature, riparian areas are subject to frequent disturbance, the severity of which increases with decreasing elevation. As such, they tend to be susceptible to invasion by exotic species. Invasive plants that threaten the park's riparian areas include Bermuda grass, giant reed, Johnson grass, rabbitsfoot grass, tamarisk, and wild oats.

Desert Riparian Scrub — Both Districts

This vegetation type is generally found in lower elevation floodplains and drainages. It is linear in structure because it follows drainages, and, as such, is somewhat more mesic than immediately adjacent vegetation types. This vegetation type is characterized by overstory vegetation consisting of velvet mesquite, desert hackberry, whitethorn and catclaw acacia, Fremont cottonwood, and blue paloverde. The intermittent availability of water and denser cover in this vegetation type make it important wildlife habitat. These communities are subject to relatively frequent flooding disturbance and may provide avenues for exotics to spread into the park.

Fountain grass is problematic in these communities.

WILDLIFE

Wildlife types at Saguaro National Park are diverse, reflecting the park's ecologically strategic location. The Rincon Mountain District lies at the interface of the Sonoran and Chihuahuan deserts, and is part of the chain of scattered "sky-island" mountaintops in southeastern Arizona that connect the Rocky Mountains to the north with the Sierra Madre Mountains to the south. Wildlife from all of these biomes is represented in the Rincon Mountains. In addition, the district ranges in elevation from 2,680 to 8,666 feet, and encompasses six structurally distinct biotic communities, from Sonoran desertscrub to mixed-conifer forest. The San Pedro River, just east of this district, and the major drainages of the Rincons, which form the headwaters of Tanque Verde Creek and Pantano Wash, add riparian components to the park's faunal diversity, as well as provide wildlife movement corridors that link mountain ranges through the surrounding desert lands. Overall, the park supports a unique and diverse assemblage of thousands of invertebrates, and more than 325 vertebrates, including approximately 70 mammals, 200 birds, 50 reptiles, and eight amphibians. The challenge in maintaining this biodiversity is underscored by the fact that since the turn of the last century, desert bighorn, Mexican gray wolves, jaguars, grizzly bears, and Gila topminnows have been extirpated from the Rincon Mountain District, while the Tucson Mountain District has lost desert bighorn and white-tailed deer.

Rincon Mountain District High Country

Southeastern Arizona is largely desertscrub and desert grassland. The tops of the scattered high mountain ranges (over 6,000 feet), including the Rincons, support forests that provide habitat for a suite of wildlife species that otherwise seem incongruous to the region. Examples include black bear, white-tailed deer, porcupine, tree squirrel, eastern cottontail, Mexican spotted owl, northern goshawk, and a host of neotropical migratory bird species. Due to their limited and disjunct habitat in the region, these species are of special management concern, particularly those federally listed as threatened or endangered, such as the Mexican spotted owl.

Riparian Areas/Corridors

Riparian areas are crucial in the desert southwest not only for the precious water resources they provide and protect, but also for providing dispersal "corridors" between mountain ranges for large terrestrial vertebrates. Species that rely on these areas, particularly at the lower elevations, include all of the park's aquatic species (e.g., Sonoran mud turtle, canyon tree frog), and animals that must drink water on a regular basis, such as mountain lions, bobcats, coyotes, javelinas, foxes, skunks, bats, and many birds. Riparian areas in the Rincon Mountain District also support many sensitive species, including lowland leopard frog, canyon whiptail, many neotropical migratory bird species including gray hawk and yellow-billed cuckoo, and possibly Mexican garter snake and the cactus ferruginous pygmy-owl (a state species of special concern). These species are all of special management concern nationally, statewide, and/or locally, primarily due to dwindling numbers and habitat.

Water sources in the Rincon Mountain District that continue to contain water during drought periods (generally a few tinajas within larger drainages, but also some short reaches of Chimenea and Rincon creeks) are crucial to wildlife, and in some cases are essential to the persistence of a species in an area. Loss of these resources can be caused by nearby groundwater pumping, erosion from wildfires, or invasion of exotic species such as tamarisk

and buffelgrass. These losses could be disastrous for wildlife.

Rincon Mountain District Desertscrub

Wildlife in the lower elevations of the Rincon Mountain District is comprised of species typical of the Arizona Upland subdivision of the Sonoran Desert, including more than 230 vertebrate species. Resident fauna includes such well-known and conspicuous species as mule deer, coyote, javelina, western diamond-back rattlesnake, roadrunner, Gambel's quail, and many lizard and bird species. Rarer and more reclusive animals, such as the golden eagle, mountain lion, Sonoran desert tortoise, and Gila monster, also occupy this habitat.

Tucson Mountain District Desertscrub

Overall, the fauna of the Tucson Mountain District is similar to the wildlife found in the lower elevations of the Rincon Mountain District. However, the Tucson Mountain District is lower in elevation (2,180 feet at the lowest), flatter, and sandier than the Rincon Mountain District, and thus contains some faunal elements associated with the Lower Colorado subdivision of the Sonoran Desert—such as kit fox, desert iguana, and sidewinder—that do not occur in the Rincon Mountain District.

Urbanization and development increasingly surround both districts. Fragmentation is a threat to the long-term viability of larger terrestrial vertebrate populations. The Tucson Mountain District has already lost desert bighorn and white-tailed deer.

THREATENED, ENDANGERED, AND SPECIES OF CONCERN

Wildlife

There are three wildlife species listed by the U.S. Fish and Wildlife Service as threatened, endangered, or a candidate for listing that are known to occur, or have relatively recently occurred, in Saguaro National Park: the lesser long-nosed bat, Mexican spotted owl, and yellow-billed cuckoo. The Rincon Mountain District contains designated critical habitat for the Mexican spotted-owl. The endangered Gila topminnow has been proposed to be reintroduced into the park.

Lesser long-nosed bat. The lesser long-nosed bat is a nectar-feeding bat that migrates between its wintering grounds in the drier parts of Mexico and its breeding/summering grounds in northern Mexico and in southern Arizona and New Mexico in the United States (USFWS 1995a). Lesser long-nosed bat migrations coincide with the availability of the nectar, pollen, and fruit of columnar cactus (e.g., cardon, organ pipe cactus, saguaros) and the nectar and pollen of blooming agaves. In Arizona, this bat species forms large maternity colonies where young are born in June. Maternity roosts are typically in caves or abandoned mines and are found in "lower elevations near concentrations of flowering columnar cacti" (USFWS 1995a). Beginning mid-July, bats appear in caves and mines in southeastern Arizona, forage on agave blooms, and leave the area in September and October. Most late-summer colonies are females and volant young, but small bachelor colonies exist also. The bat is listed by the U.S. Fish and Wildlife Service as federally endangered, primarily due to loss of roosting habitat and vulnerability to disturbance of maternity colonies and other roosting sites (Shull 1988).

Bat surveys in Saguaro National Park confirmed a small (less than five individuals since 1991) colony of lesser long-nosed bats roosting in a cave in the Rincon Mountain District (Sidner 1991, Sidner & Davis 1994). This species is presumed to be foraging in the dense saguaro stands of the district early in the summer, and perhaps using agave flowers found at higher elevations in this district (3,000-7,000 feet) later in the year. Although

surveys were conducted in 1991 and 2003 to locate lesser long-nosed bats, or evidence of them, in mines in the Tucson Mountain District, this species has never been documented in that district (Sidner 1991, Wolf and Dalton 2003).

Since 1994, park staff, Arizona Game and Fish Department (AGFD) biologists, private contractors, and volunteers have surveyed for the cactus ferruginous pygmy-owl within and nearby the park. Surveys through 2000 (about 250 in the Rincon Mountain District and 250 in the Tucson Mountain District) were about equally divided between inventory efforts and surveys. A total of 350 surveys (half in each district) have been conducted by the park during annual surveys for the period of 2001–2004. All of these surveys followed protocols specified by the Arizona Game and Fish Department and the U.S. Fish and Wildlife Service at the time.

There was a probable detection of a ferruginous pygmy-owl in March 1984, and a confirmed detection on October 12, 1995, in the Rincon Mountain District. There is an unverified report of a roadkill cactus ferruginous pygmy-owl in the Tucson Mountain District from January 2, 1988 (NPS files). The species has also been reported from King Canyon, but it is unknown if the report was from within the park or in the adjacent Tucson Mountain Park (Pima County Parks and Recreation Department). Fire management policy that precludes fires in desertscrub and riparian areas should protect this species and its habitat.

Mexican spotted owl. The Mexican spotted owl is one of three spotted owl subspecies, and is listed as threatened by both the U.S. Fish and Wildlife Service and the Arizona Game and Fish Department (USFWS–58 FR 14248, AGFD 1988). Spotted owls are large (relative to other North American owls), dark-eyed owls that lack ear tufts, and are generally brown with heavy white to beige spotting. The Mexican subspecies is disjunctly distributed from southern Mexico northward into southern Utah and central Colorado (USFWS 1995b).

Mexican spotted owl surveys in the park since 1992 have documented five territories in the Rincon Mountain District where this owl nests. Four territories are on Mica Mountain and the fifth is on Rincon Peak. These territories are occupied every year, though sometimes by only one bird or a non-breeding pair. Protected Activity Centers have been established for each of these territories. In February 2001, the U.S. Fish and Wildlife Service designated much of the Rincon Mountain District as critical habitat for the Mexican spotted owl.

Yellow-billed cuckoo. The yellow-billed cuckoo was designated by the U.S. Fish and Wildlife Service as a candidate species for listing under the Endangered Species Act. It is a medium-sized bird with a slender, long-tailed profile. It is found in large blocks of riparian woodlands (cottonwood, willow, or tamarisk groves), and feeds exclusively on insects.

In southeastern Arizona, the yellow-billed cuckoo is a summer resident in tall, dense, riparian growth, mostly in the San Pedro, Patagonia-Sonoita Creek, and Arivaca Creek drainages. In the Rincon Mountain District it is considered a transient and potential breeder; there was a recent sighting at Rincon Creek.

Gila topminnow. The endangered Gila topminnow is a small live-bearing minnow in the family Poeciliidae. This fish historically occupied larger streams and rivers throughout the Gila River Basin, where they were found in the shallow margins of main river channels or backwaters, since they prefer quiet, warm waters with slow currents and abundant aquatic vegetation. In the past 100 years, human changes to the environment—particularly dams; the dewatering of cienegas, swamps, springs, and streams; and introductions of exotic, predatory fish and other aquatic

fauna—have reduced the distribution of Gila topminnow to about 10 disjunct remnant populations (Weedman and Young 1997).

The Gila topminnow is considered extirpated in Saguaro National Park. However, the one site at which they were known to occur in the past is recommended for potential "additional management action or restocking" (U.S. Fish and Wildlife Service, Arizona Ecological Services Field Office, correspondence dated August 7, 1997). This site is a series of pools in the Wildhorse Drainage on the north slope of Tanque Verde Ridge in the Rincon Mountain District. Although these pools dry out/silt in intermittently, generally they do not all dry up at the same time. Presumably there was some thought that a population could possibly be reintroduced at this site. It should be noted, however, that in 2000, after the Box Canyon wildfire and heavy summer rains, the tinajas in this drainage underwent substantial siltation that dramatically reduced their water retaining capacity. Subsequently, in 2002, a drought year, every tinaja in the entire drainage dried up by mid-June (Don Swann, pers. com.). This series of events documents the important and dynamic relationship between fire, erosion, and surface water in the park, and emphasizes the need for understanding, predicting, and managing this phenomenon.

Rare and Protected Wildlife Species

Also, 17 federal or state-listed "species of special concern" or "sensitive species" (Appendix G) occur or have occurred in the park: northern goshawk, northern gray hawk, western burrowing owl, common black-hawk, northern buff-breasted flycatcher, American peregrine falcon, Mexican long-tongued bat, Townsend's big-eared bat, western red bat, California leaf-nosed bat, cave myotis, pocketed free-tailed bat, yellow-nosed cotton rat, desert tortoise, giant spotted whiptail, lowland leopard frog, and cactus ferruginous pygmy-owl. A brief description is provided below.

American peregrine falcon. This impressive bird was delisted from endangered status by the U.S. Fish and Wildlife Service in August 1999; however, their numbers were to be monitored through 2004 to ensure their recovery. Park staff continue to monitor the falcons. This large, striking falcon is primarily a hunter of small- to medium-sized birds that are often associated with water (e.g., waterfowl, shorebirds, swallows, etc.). Along with a proximity to water, the most important habitat characteristic needed by this species is the presence of tall cliffs (typically over 150 feet but sometimes as low as 60 feet). Within this habitat, peregrines nest on ledges, in potholes, or in small caves that are relatively inaccessible to mammalian predators and that also provide protection from weather extremes.

In Arizona, peregrine falcon breeding activity was documented at 179 locations in 1992 (Ward 1993). Within the park, peregrines are known to nest at four locations. Two of these eyries have been occupied continuously since at least 1992 (Berner and Mannan 1992, Bailey 1993, Kline 1994, SNP unpublished data).

Cactus ferruginous pygmy-owl. The cactus ferruginous pygmy-owl is a small (about 6.75 inches long), long-tailed, earless owl that is considered a state species of special concern. (It was delisted from federal endangered status in 2006.) Loss of habitat is suspected as the major cause of its decreased numbers (USFWS 1993). This pygmy-owl is the northernmost subspecies of the wide-ranging but tropically based ferruginous pygmy-owl. Although historic accounts associated this subspecies with riparian woodlands and mesquite bosques in Arizona USFWS 1993), recent sightings of these pygmy-owls in the state have generally been in the paloverde-cacti-mixed scrub series of Sonoran desert-scrub in the Arizona Upland subdivision. Both districts of Saguaro National Park contain potential habitat for the cactus ferruginous pygmy-owl — virtually all of the Tucson and Rincon Mountain districts below 4,000 feet (some 40,000 acres total). Park staff continue to monitor these owls.

Plants

There are no plant species currently listed as threatened or endangered, nor are there candidates for threatened or endangered status. The park has a number of species protected by the state of Arizona, some of which have been listed as USFWS "Species of Concern." This is an informal designation for species in need of concentrated conservation actions, depending on the health of the population and the type and degree of threats. Sensitive plant species found in the park are Pima Indian mallow, Trelease agave, Needle-spine pineapple cactus, Lemmon milkweed, Tucson Mountain spiderling, magenta-flower hedgehog-cactus, Mexican broomspurge, feather bush, Thornber fishhook cactus, weeping muhly, Lemmon cloak fern, Kelvin cholla, staghorn cholla, desert night-blooming cereus, Pringle lipfern, Chiricahua Mountain brookweed, nodding blue-eyed grass, and Tumamoc globeberry.

SOILS / GEOLOGIC RESOURCES

Saguaro National Park is within the Mexican Highland section of the Basin-and-Range physiographic province. However, the Rincon Mountain and Tucson districts contain markedly different geological resources. The Rincon Mountain District displays a metamorphic core complex, while the Tucson Mountain District consists of fault-bounded structures and volcanic rocks.

The Rincon Mountains are considered to be the "showpiece" of metamorphic core complexes. Features represented in this district include features related to the metamorphic core complex, such as the Catalina Fault and mylonite gneiss; inverted Paleozoic stratigraphy; and foliations, faults, and gneiss along Cactus Loop Drive.

Because of the region's semi-arid climate, soils are not well developed in Southern Arizona. The ground surface of most of the Rincon Mountains consists of bedrock or regolith. A thin veneer of alluvium covers pediment surfaces along the margins of the range. This alluvial fill thickens to tens of feet along larger drainages, such as Rincon Creek, and has been cut into terraces by stream entrenchment in places. Aridisols with calcium carbonate (caliche) concentrations have developed on this deeper alluvium. Aridisol is a soil that is typically saline or alkaline with very little organic matter and is found in arid regions. At the highest elevations, where the natural vegetation is coniferous forest, thin soils with distinctive soil horizons have developed.

The Tucson Mountain District is typical of the Basin-and-Range physiographic province and consists of a normal-faulted, east-tilted wedge of Paleozoic and Mesozoic sedimentary rock. The Tucson Mountains themselves are composed of intrusive plugs, flow and welded tuffs, and sedimentary rocks; the lower slopes of the mountains are covered by terrace deposits or other alluvium, sometimes up to 400 feet thick (NPS 1995). The soils of the Tucson Mountain District slopes are shallow, coarsely textured, and well-drained, and soils of the bajadas are alluvial (NPS 1991). Soils become progressively finer with more sand and clay from bedrock to bajada to flats. Granite weathers rapidly into gruss, forming "plant friendly" soils.

Soils located on fan terraces have wind and water erosion hazards. Both districts of the park have fan terraces with erosion hazards. The fan terraces with erosion concerns range in elevation from 2,180 to 3,600 feet. Erosion from water typically occurs during heavy rains, which creates sheet erosion instead of a slow percolation of water into the soil that occurs during slower, gentler rainfalls. Wind erosion is an ongoing concern. The best management practice to minimize water and wind erosion is to maintain a healthy vegetative cover. Vegetation holds the soil in place during rain and high winds, preventing soil movement. Constraints on revegetation are primarily due to limited water availability in the soil. (See Appendix B, for additional information on soils and geologic resources.)

SOUNDSCAPE

Sound levels in Tucson Mountain District were measured in two locations in November 2004. These measurements evaluated the noise levels associated with traffic on Picture Rocks Road and Golden Gate Road and the rate of noise drops as one moves farther from the roads. Acoustic measurements calculated included L_{eq}, L_{50}, and L_{90}. The L_{eq} is useful for quantifying intruding sounds because its magnitude depends heavily on the loudest periods of a time-varying sound. Exceedence values (L_x) are commonly used to describe ambient sound conditions. The L_{50} value represents the sound level exceeded 50% of the time during the measurement period (L_{50} is the same as the median). The L_{90} value represents the sound level exceeded 90% of the time during the measurement period. L_{50} and L_{90} are useful measures for describing ambient sound conditions. The L_{50} measure is a good descriptor of the "existing ambient" sound level, which includes all natural and human-caused sounds in a given area. The L_{90} measure is often used to describe the "natural ambient sound level," which consists of all natural sounds in a given area, excluding all human-produced sounds. Table 11 presents the typical sounds heard in various national parks.

The vehicle speed limit on Picture Rocks Road and Golden Gate Road is 35 mph near the measuring stations. The mean L_{eq}, L_{50}, and L_{90} measured 100 ft from Picture Rocks were respectively 55.3 dBA, 45.4 dBA, and 35.2 dBA. The mean L_{eq}, L_{50}, and L_{90} measured about 240 feet from Golden Gate Road and approximately 0.9 mile south of Picture Rocks Road were 39.8 dBA, 34.7 dBA, and 31.4, respectively. Human-caused sounds could be heard at both measurement locations in the Tucson Mountain District at all times of the day and night during the measurement period.

To better determine the natural ambient sound levels for Sonoran desertscrub habitat, sound level measurements were taken in the Rincon Mountain District in April 2005. The recordings were taken near the old Madrona ranger station. The L_{eq}, L_{50}, and L_{90} measurements recorded at Madrona were 30.2 dBA, 25.4 dBA, and 22.6 dBA, respectively. This location was the farthest from nonnatural sound sources such as highways and airports. Acoustic measurements for this location were the lowest of all three locations, and likely are the most representative of natural sound levels in a Sonoran desertscrub habitat.

The first location 100 feet from Picture Rocks Road was greatly influenced by vehicle traffic, and the second location about 0.9 mile from Picture Rocks Road, was also, but to a lesser degree, influenced by vehicle sounds on Picture Rocks Road. From these limited data, it appears that the mean natural ambient sound level for a Sonoran desertscrub habitat during the summer season is between about 22 dBA and 25 dBA for all hours. From the measured acoustic data at the two stations in the Tucson Mountain District, it appears that traffic sounds on Picture Rocks Road drops about 10 dBA per mile in this vegetation type and terrain.

TABLE 11. SOUNDS RECORDED IN NATIONAL PARKS AND APPROXIMATE dBA LEVEL AND DISTANCE

Sound Location and Type	dBA
Threshold of human hearing	0
Haleakala National Park — volcano crater	10
Canyonlands National Park — leaves rustling	20
Zion National Park — crickets (5 m)	40
Whitman Mission National Historic Monument — conversational speech (5 m)	60
Yellowstone National Park — snowcoach (30 m)	80
Arches National Park — thunder	100
Yukon-Charley Rivers National Monument — military jet (100 m above ground)	120

SOURCE: Ambrose and Florian 2006

CULTURAL RESOURCES

INTRODUCTION

The cultural resources of Saguaro National Park and its environs represent several periods of prehistory and history. These are the Indigenous Period, circa10000 BC to AD 1539; the Spanish Period, 1539 to 1821; the Mexican Period, 1821 to 1854; and the American Period, 1854 to the present (NPS 1987a).

ARCHEOLOGICAL RESOURCES

Saguaro National Park contains 435 known archeological sites (NPS 2001a:37, NPS 2003:11, and pers. comm. with Susan Wells, Chief of the Archeology Division, NPS Western Archeological and Conservation Center by Dr. Lawrence Van Horn, NPS Denver Service Center, February 17, 2006). Of the approximate number of 91,440 total acres of the park, about 23,425 acres (26%) have been archeologically surveyed, including the Rincon Mountain and the Tucson Mountain districts (pers. comm. with Susan Wells, Chief of the Archeology Division, NPS Western Archeological and Conservation Center by Dr. Lawrence Van Horn, NPS Denver Service Center, March 28, 2006). This percentage represents a rather complete archeological inventory (NPS 2003:11) in terms of the different types of park land forms surveyed relative to those areas expected to have been heavily inhabited over time because of the favorable geography of their locations, not just areas temporarily visited for hunting or gathering purposes, with only "some site-specific surveys [that] may still [need] to be conducted for National Historic Preservation Act compliance for specific purposes" (NPS 2003:11). Relevant studies are listed in the "Selected References" section near the end of this document.

The archeological sites at Saguaro National Park span more than 8,000 years of human occupation during prehistoric and historic times. The prehistoric sites consist primarily of Archaic and later Hohokam artifact scatters with low surface visibility and expression. These scatters represent campsites, farmsteads, and villages with some places included that were quarry sources to manufacture stone tools. Other prehistoric sites include rock art (petroglyphs and pictographs), rockshelters, and bedrock milling sites. The American period sites include those that represent ranching and mining. Remnant commercial lime kilns exist that contributed to the growth of Tucson via the white-washing of the outside walls of new business and residential structures. Adobe ruins of Camp Pima of the Civilian Conservation Corps (CCC) are present, along with historic-period trash scatters. The Freeman Homestead and the lime kilns are listed in the Arizona State Register of Historic Places.

Most of the sites in the Rincon Mountain District of Saguaro National Park below 4,000 feet are contributing elements to the Rincon Mountain Foothills Archeological National Register District indicative of villages and other habitation sites such as campsites of lesser duration. This district, including Archaic sites but especially rich in Hohokam material, was listed in the National Register of Historic Places on October 16, 1979. Lands added to the Rincon Mountain District of the park in the 1990s contain additional archeological sites being treated as eligible for the National Register of Historic Places as are archeological sites in the park's Tucson Mountain District.

The Rincon Mountain Foothills Archeological District in the park was listed in the National Register of Historic Places on October 16, 1979. The archeological sites at Saguaro National Park span more than 8,000 years of

prehistoric and historic-period occupation. The prehistoric sites are primarily Archaic and Hohokam artifact scatters with low surface visibility and expression. The artifact scatters represent villages, campsites, farmsteads, and stone quarries. Other prehistoric sites include rock art (petroglyphs and pictographs), rockshelters, and bedrock milling sites. The American period sites include ranching sites, mining sites, lime kilns, Civilian Conservation Corps features, and trash scatters. The Freeman Homestead and the lime kilns are on the Arizona State Register of Historic Places.

Most of the sites in the Rincon Mountain District of Saguaro National Park below 4,500 feet are contributing elements to the Rincon Mountain Foothills Archeological District. Lands added to the park's Rincon Mountain District in the 1990s contain archeological sites that are being treated as eligible for the National Register of Historic Places, as are archeological sites in the park's Tucson Mountain District.

CULTURAL LANDSCAPES

A cultural landscape is "a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values. There are four general kinds of cultural landscape, not mutually exclusive: historic site …, historic designed landscape …, historic vernacular landscape …, and ethnographic landscape…." (NPS 1998a:179). Cactus Forest Drive in the Rincon Mountain District has historic designed landscape components. The Civilian Conservation Corps (CCC) built it circa 1935 to 1939 during President Franklin D. Roosevelt's New Deal era of public works. Known for its circuitous, roughly heart-shaped route and its associated rock work of native stone for culverts, curbing, and retaining walls, this scenic drive is an eight-mile paved, mostly one-way loop, with a two-way portion from the visitor center to the Javelina picnic area. It winds through a forest of notably saguaro cacti and offers visitors the opportunity for a close leisurely look at a variety of Sonoran Desert life and vistas.

On May 18, 2005, in recognition of its significance, Cactus Forest Drive was formally determined eligible for listing in the National Register of Historic Places as a historic structure with cultural landscape components (NPS 2005b).

Other historic cultural landscapes in Saguaro National Park that need to be inventoried and evaluated include the following as potentially eligible for listing in the National Register of Historic Places (Jill Cowley, historic landscape architect, NPS Intermountain Region, Santa Fe Office, e-mail to Dr. Larry Van Horn, cultural resource specialist, NPS Denver Service Center, February 26, 2003):

- Amole Mining District
- Civilian Conservation Corps Landscape
- Freeman Homestead
- Lime-making Landscape
- Manning Camp
- Rincon Foothills Archeological District

Potential ethnographic landscapes are associated with ethno-historic American Indian occupation or use of what is now the park, and four tribes have been suggested for further investigation of possible national register eligibility as a cultural landscape (Jill Cowley, historic landscape architect, NPS Intermountain Region, Santa Fe Office, e-mail to Dr. Larry Van Horn, cultural resource specialist, NPS Denver Service Center, February 26, 2003):

- Apache Ethnographic Landscape
- Maricopa Ethnographic Landscape
- Akimel O'odham (also known as Pima) Ethnographic Landscape

- Tohono O'odham (formerly known as Papago) Ethnographic Landscape

Please note that these have been suggested only at the conceptual stage with no inventorying. It is possible that with study a combined American Indian ethnographic landscape could emerge that would include all of the contemporary Indian peoples known to have frequented what is now the park. For example, because of prehistoric contacts with the Hohokam who once lived in what is now the park, the Pueblo of Zuni could be considered as an American Indian tribe traditionally associated with Saguaro National Park. Those peoples who might be part of an American Indian ethnographic landscape could include the Akimel O'odham (also known as Pima), the Apache, the Hopi, the Maricopa, the Yaqui, the Tohono O'odham, the Yavapai, and the Zuni.

Because of the proximity of the Tohono O'odham Nation to Saguaro National Park, this tribe seemingly uses the park more than other tribes. Traditional use of the park by the Tohono O'odham for harvesting saguaro fruit is discussed in the section on ethnographic resources.

ETHNOGRAPHIC RESOURCES

An ethnographic resource is identified by way of a specific contemporary human group or family using a particular place over time in accord with that group's traditional cultural heritage and social identity. More specifically, an ethnographic resource is "a site, structure, object, landscape, or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it" (NPS 1998a:181). The pictographs in the national park are attributed to the Hohokam people (NPS 2001b:8) and could conceivably constitute ethnographic resources because the Hohokam may well be ancestors of the neighboring Tohono O'odham Indians. Although there could possibly be a relationship, the neighboring Tohono O'odham have not expressed any relationship as a contemporary people to the prehistoric Hohokam pictographs in the park. Nonetheless, the saguaro-fruit-gathering area in the Tucson Mountain District of the park is an ethnographic resource. It is used traditionally by the Tohono O'odham.

In conjunction with European contact by way of the Spanish with the Tohono O'odham, the gathering of saguaro fruit in the Sonoran Desert is documented as far back as the 16th century (Beal 2005:B1). It of course is much older than that as part of Tohono O'odham history and culture.

Ethnographic resources eligible for the National Register of Historic Places are called traditional cultural properties (NPS 2006e: 257). Depending upon whether or not the Tohono O'odham might wish it nominated, the area for gathering saguaro fruit in the park is an ethnographic resource that is potentially eligible for the national register as a traditional cultural property and is being treated accordingly. An ethnographic study of this area is underway to provide additional information for managing and interpreting the site and could be a vehicle to find out if the Tohono O'odham desire its nomination to the national register as a traditional cultural property. Participation in the study is with fruit-gathering individuals and is being done in consultation with officials of the Tohono O'odham Nation. If the site was nominated as a traditional cultural property, it would be researched and prepared in accordance with *National Register Bulletin 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties* (NPS 1998b).

The harvesting of saguaro fruit (with long poles of dead saguaro ribs bound together to reach up to detach the ripening fruit growing on the arms of cacti) is documented in the park back to July 14, 1955 (Phares Keller Weis, photo editor of the *Tucson* (Arizona) *Citizen,*

pers. comm. with Dr. Lawrence F. Van Horn, cultural resource specialist, NPS Denver Service Center, February 13, 2003). In what was then called Saguaro National Monument, West — now the Tucson Mountain District of Saguaro National Park — a photograph on that date was taken of saguaro fruit harvesters in the park using the long poles to collect the fruit. This historic photograph in the files of the *Tucson Citizen* shows Juanita Ahill, a Tohono O'odham woman, who was well known as a saguaro fruit gatherer. The photo was taken for the April 1983 cover of *Arizona Highways*. Stella Tucker, her great niece, now leads the group of gatherers in the park (Beal 2005).

Saguaro fruit is gathered in late June or early July when it ripens. It is used to make saguaro jam and syrup and, of major importance culturally, to make saguaro wine. The wine is made by adding water to saguaro juice and letting it ferment. When the wine is ready, it becomes the focus of the rain ceremony that calls for drinking the wine and reciting poems or singing songs that tell of "the rising of the clouds over the mountains and the coming of the frogs or the spiders who bring the rain" for the crops that the Tohono O'odham plant (Underhill 1979:44).

HISTORIC STRUCTURES

Civilian Conservation Corps (CCC) Structures

The dates of December 22, 1933, through June 21, 1941, mark the occupation by the Civilian Conservation Corps of Camp Pima in the Tucson Mountain District, which contained 32 frame and adobe buildings. Today basically only adobe ruins remain, although there are some remains of concrete foundations for the frame structures.

CCC members are well known for having contributed greatly to the rustic architectural style of certain visitor facilities in units of the national park system. In what is now Saguaro National Park, the rustic structures were constructed of stone and are characteristic of the picnic areas, which generally consist of ramadas as shelters with picnic tables, benches, fireplaces, and nearby restrooms (NPS 1987a:223-224). The Tucson Mountain District contains five such picnic areas, which are named Cam-Boh, Ez-Kim-In-Zin, Mam-A-Gah, Signal Hill, and Sus. Along with the aforementioned picnic areas, the CCC-built Cactus Forest Drive in the Rincon Mountain District exhibits attributes of the NPS rustic architectural style. Design is naturalistic to blend into the landscape and seem like part of it. In the case of road design, it fits in with the physical setting to accommodate scenic views and to show natural features to their best advantage like stands of native cacti. With its stone retaining walls and turnouts with low stone curbing to pull off the road and enjoy the scenery, Cactus Forest Drive winds through a so-called cactus forest with an alignment that though now paved is very close to the unpaved original.

The two picnic areas in the Rincon Mountain District, Javelina and Mica Views, are later than the CCC era. The CCC construction in this district involves roadside features of stonework on the Cactus Forest Drive, such as culverts, retaining walls with drainage openings, and other road delineations. On May 18, 2005, Cactus Forest Drive was determined eligible for listing in the National Register of Historic Places as a historic structure with cultural landscape components (NPS 2005b).

Civilian Aeronautical Administration Building in the Madrona Area

The Civilian Aeronautical Administration (CAA) building in the Madrona Area of the Rincon Mountain District was moved into the park in 1957. It is estimated to have been built sometime between 1920 and 1950 and is considered eligible for listing in the National Register of Historic Places per a

determination on December 9, 1994, of the state historic preservation officer (NPS List of Classified Structures 2006b). Distinctive architectural details include window hoods for shade and hip knobs for decoration giving a “gingerbread” effect. In the park, the building was used to store tack for packing horses up into the Rincon Mountains. It is of wooden-frame construction with a concrete foundation and metal roof and walls. The Civilian Aeronautical Administration building is insufficiently documented. There appear to be no records so little is known about this structure. However, its pattern of distinctive architectural details makes its style unique in the park. It is unusual in decorative detail for its presumed utilitarian function. The determination of eligibility for local significance marks an NPS-state historic preservation office agreement for the National Park Service to treat this building as national-register eligible.

Manning Cabin at Manning Camp

Manning Cabin, at Manning Camp, is a log cabin 60 feet by 22 feet of two rooms connected by a covered and enclosed "possum-trot" or “dog-run” walkway. It has an end chimney of field stone attached to the kitchen/living room. Its logs are chinked with mortar. It has wooden sash windows and, once covered with rolled roofing, is now roofed with asphalt shingles in a one-storey pattern with gable ends. The property includes several tent platforms to accommodate fire-fighting and trail-maintenance crews and a corral for their horses, as well as a backcounty campground with pit toilets for visitors and hitching posts for horses. Manning Camp is reached only via trail on foot or by horseback.

Manning Cabin was listed in the National Register of Historic Places on March 31, 1975. It is a log structure in the cool of the Rincon Mountains that was completed by mid-summer 1905. Levi Howell Manning (1864-1935) had it built as a summer retreat from the heat of Tucson. “Manning was the first to build such a cabin retreat in the [park’s] mountains” (NPS 1987a:175-176). He started out in Tucson as an ice-wagon driver and rose to become a prominent businessman in real estate, mining, stock brokering, and cattle and horse ranching. President Grover Cleveland appointed him the United States Surveyor General for the Arizona Territory in 1893, and in 1905 he began a term as mayor of Tucson. Manning cleared an 11-mile road up to his cabin, over which he had a piano hauled by wagon for family use in the cabin.

The family apparently enjoyed the cabin during the latter half of the summer of 1905 and for the entire summers of 1906 and 1907. The family never used the cabin after 1907 because Manning lost his homesteading rights to his160-arce cabin property. It became part of the Santa Catalina Division of Coronado National Forest. From 1907 to 1922, “only an occasional hunter, rancher, or forest ranger visited the structure” (NPS 1987a:176). In 1922, it became quarters for members of the Forest Service’s fire watch and trail crew to guard against and fight forest fires. President Herbert Clark Hoover proclaimed the land Saguaro National Monument on March 1, 1933, via Presidential Proclamation number 2031. Incoming President Franklin Delano Roosevelt transferred jurisdiction over Saguaro National Monument from the U.S. Forest Service to the National Park Service on June 10, 1933, via Executive Order 6166 for execution on August 10, 1933. Transfer of responsibility to the National Park Service for forest fire protection, however, did not take place until 1940. Manning Cabin remained as fire-guard quarters and so served from 1922 to 1958 “when a break in its use occurred until 1977” (NPS 1987a:244). It continues as fire-guard quarters today.

Adolph Berle Clemensen (NPS 1987a:175-208, 244) in his historic resource study of the park describes changes at Manning Cabin over the years. The changes reflect the cabin’s

importance both as representative of the development of summer homes in the mountains and of a place in the mountains needed to accommodate fire-management personnel.

Manning Dam at Manning Camp

According to the NPS List of Classified Structures, Manning Dam is eligible for listing in the National Register of Historic Places. It is a small dam near Manning Cabin. It was built by Levi Howell Manning in 1905 as part of constructing Manning Cabin. Then as now, its purpose is to hold back water for pumping, filtration, and treatment for consumption and other purposes at the cabin. Construction is of rock and concrete with a poured concrete top.

Dam expansion occurred in 1930. It provided drinking water for U.S. Forest Service and National Park Service fire and trail crews using Manning Camp as a base. Of local significance, the state historic preservation officer on December 9, 1994, determined Manning Camp Dam to be eligible for listing in the National Register of Historic Places. The dam is about 12 to14 inches wide, 20 to 25 feet across at the top, and 10 to 14 feet high. It is a component of Manning Cabin, which is listed in the National Register of Historic Places.

VISITOR USE AND EXPERIENCE

The planning team identified visitor use and experience as an important issue that could be appreciably affected with implementation of the alternatives. The Organic Act and NPS *Management Policies 2006* direct the National Park Service to provide visitor enjoyment opportunities that are uniquely suited to the superlative natural and cultural resources found in the park. Different aspects of visitation and enjoyment are evaluated: visitor use and characteristics; range of recreational opportunities; opportunities for solitude and getting in touch with nature; opportunities for orientation, education, and interpretation; and visitor access, including access for disabled visitors; regional recreational opportunities.

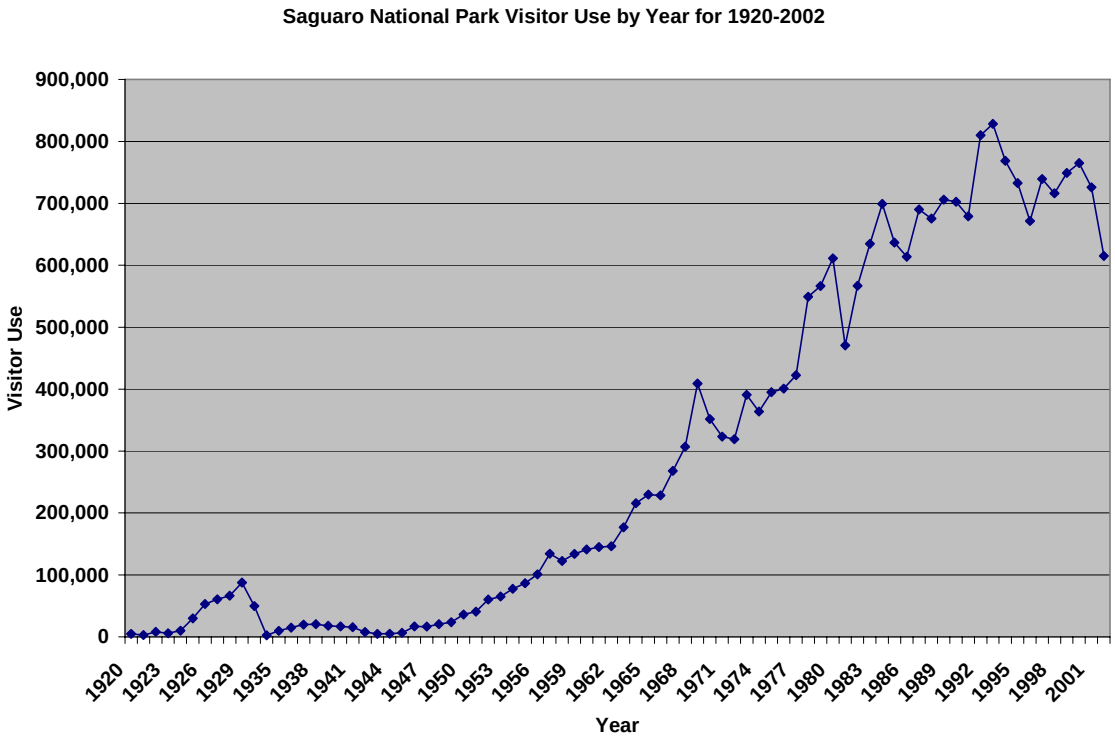
To provide the sociological data necessary to support management planning, the *Saguaro National Park Transportation and Visitor Use Study* was conducted by Arizona State University and summarized by David Evans and Associates (2006). The study was conducted from November 2003 to March 2004 to capture information from the peak visitor use seasons. The study collected information about visitor use levels, demographic characteristics, management preferences, and perceptions of natural, social, and managerial conditions. Data was collected from on-site adult park visitors at the Rincon Mountain District and Tucson Mountain District of Saguaro National Park through mail survey questionnaires distributed at various locations throughout the park. In addition, data was collected from adult park visitors that are neighbors to the park through mail survey questionnaires sent to a sample of residents within a half a mile of each park unit.

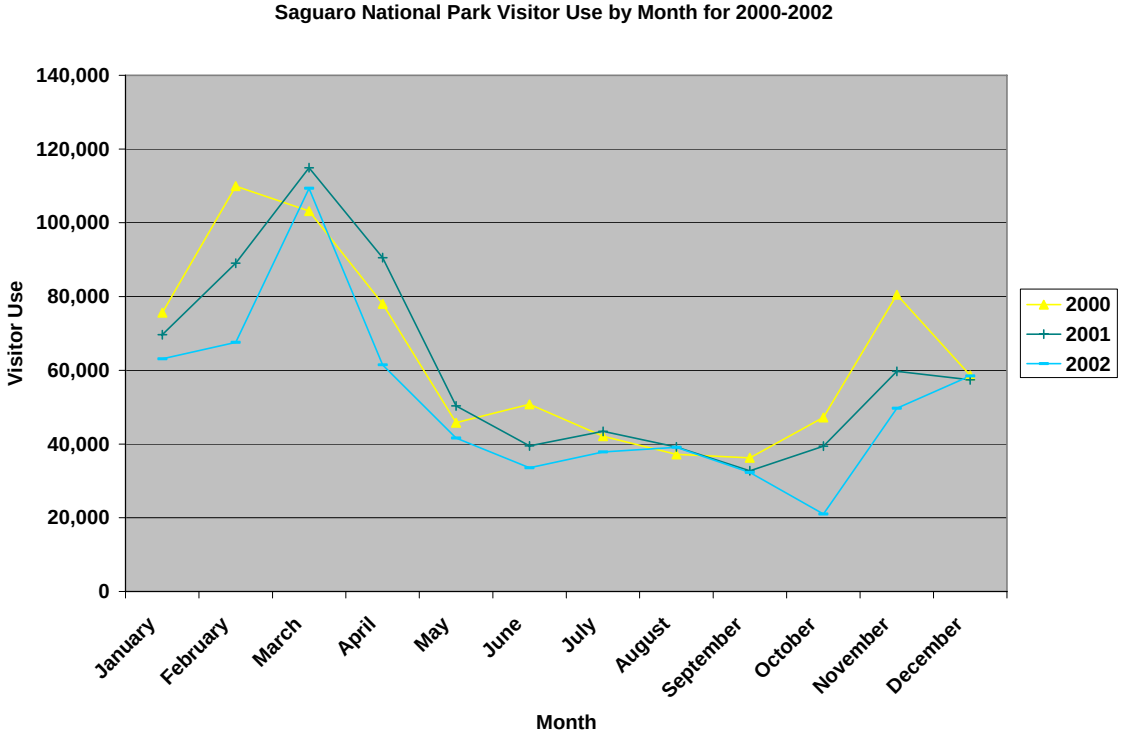
The survey results are separated by those visitors contacted on-site (referred to as "visitors" in the summary discussion below) and neighbors that visit the park (referred to as "neighbors" in the discussion below. The study will be referred to as the 2003–04 visitor study (David Evans and Associates 2006). The study results will be presented by the Tucson Mountain District and Rincon Mountain District and by each survey population (visitor and neighbor).

VISITOR USE AND CHARACTERISTICS

Visitation to Saguaro National Park has generally increased from the 1920s, with slight declines in visitation from 1980–81, 1993–96, and 2000–02 (see figure 1). Visitation peaked at 828,000 visitors in 1993 (National Park Service 2004e). The most recent decline in visitation corresponds to a decline in visitation to Grand Canyon and other Arizona national parks and monuments, as well as other Arizona communities that rely on tourism. There is not a clear consensus as to the cause for the decline. A similar decline is also occurring in many of the national parks around the country.

Based on the long-term trends, and the more important consideration of the surrounding region's population growth, it is likely that the park's visitation will hold steady or slightly increase during the next 25 years. The towns and cities in Eastern Pima County are expected to grow substantially during that time frame. Saguaro National Park is visited heavily by the local and regional population, so increasing population growth will likely affect visitation rates. In addition, national and international tourism is a major factor in the area's economy due to the many scenic and recreational opportunities that are available. It is expected that the trend in visitation will increase, at least slightly, due to the continuing growth and development of tourism services in this area.





Source for both figures: National Park Service 2004e

FIGURES 1 AND 2. VISITATION BY YEAR AND BY MONTH

The typical peak periods of visitation at Saguaro are during the winter months of January through March (see figure 2) when visitors experience cooler temperatures in the lower elevations and long hikes in the backcountry become more desirable. In addition, by late February, visitors may see and photograph many annual wildflowers that brighten the desert landscape. The summer brings higher temperatures and potential intense thunderstorms, which reduces the amount of visitation and visitors' length of stay in the park.

Other visitor characteristics for both the Tucson and Rincon Mountain districts that were identified during the 2003–04 visitor study (David Evans and Associates 2006) are summarized in the table below. The results present a summary for each district of the park for both respondent populations either combined (visitors and neighbors, if results were fairly similar) or separate as most appropriate.

The visitor study results identify some distinct differences among the visitor populations to the two park districts. First, there is a slightly

TABLE 12. VISITOR CHARACTERISTICS FOR THE PARK DISTRICTS

	RINCON MOUNTAIN DISTRICT VISITOR CHARACTERISTICS	TUCSON MOUNTAIN DISTRICT VISITOR CHARACTERISTICS
Gender	Respondents included slightly more women than men.	Respondents included slightly more women than men.
Age	Most respondents ranged from 40 to 69 years of age.	Most respondents ranged from 40 to 69 years of age.
Education level	Most respondents have at least a college/technical school degree with a high percentage also having a graduate/professional degree (54% of visitors and 51% of neighbors).	Most respondents have at least a college/technical school degree with a high percentage also having a graduate/professional degree (60% of visitors and 35% of neighbors).
Primary destination	For about 67% of visitors and 81% of neighbors, yes.	For about 51% of visitors and 67% of neighbors, yes.
Average group size	Three people per group.	Two people per group
Residency	About 59% of visitors were from Arizona.	About 42% of visitors were from Arizona.
	Thirty-six percent were from out of state with Illinois, Minnesota, New York, California, Colorado, Washington, Wisconsin, Pennsylvania, and Michigan representing at least 10 or more visitors each.	Fifty-two percent were from out of state with Michigan, California, Illinois, Massachusetts, and Colorado representing at least seven or more visitors each.
	About 5% of visitors were from a foreign country.	About 6% of visitors were from a foreign country.
Frequency of visits	About 25% of visitors have been to the park between one and five visits. Around 23% had visited 100 or more times.	About 44% of visitors have been to the park between one and five visits. Around 10% had visited 100 or more times.
	About 40% of neighbors had been to the park at least 100 or more times.	About 42% of neighbors had been to the park at least 100 or more times.
Overnight stay on trip	About 31% of visitors stayed overnight during their trip, and of those visitors that stayed overnight, about 39% stayed in a hotel, motel, or resort and 26% stayed in a private home.	About 53% of visitors stayed overnight during their trip, and of those visitors that stayed overnight, about 52% stayed in a hotel, motel, or resort; 14% stayed in a private home, 13% stayed in a private campground, and 11% stayed in a public lands camping area.

larger average group size for visitors to the Rincon Mountain District than the Tucson Mountain District (three versus two respectively). Also, the Rincon Mountain District is more often a primary destination for visitors and neighbors than the Tucson Mountain District. This is likely due to the proximity of other major attractions to the Tucson Mountain District, specifically the Sonoran Desert Museum and Old Tucson. These attractions are directly to the south of the Tucson Mountain District, and many visitors visiting this district also frequent these well-known sites, making the Tucson Mountain District one of many trip destinations.

Another difference between visitors to the two districts is the higher number of repeat visitors to the Rincon Mountain District than Tucson Mountain District. As noted above, almost 25% of Rincon Mountain District visitors have been to the park 100 or more times, compared to only 10% of Tucson Mountain District visitors. Another difference is the higher percentage of out-of-state and international visitors going to the Tucson Mountain District, as well as the higher percentage of Tucson Mountain District visitors that stay overnight as part of their trip. These differences are likely due to the spectacular stands of Saguaro in the Tucson Mountain District and the proximity of the other Sonoran Desert attractions already mentioned, which likely draw more first-time, nonlocal visitors to the Tucson Mountain District. The Rincon Mountain District seems to attract more local and regional visitation, which is likely due to its proximity to the city of Tucson and the extensive and diverse trail system.

Most visitors to Saguaro National Park use private vehicles to get to and around the park. According to the 2003–04 visitor study, 95% of Tucson Mountain District visitors and 78% of that district's neighbors access the park via automobile. For the Rincon Mountain District, there is a similar level of automobile access by visitors (93%), but the level of access by automobiles for Rincon Mountain District neighbors is much lower (61%), with the other major forms of access being by horse (16%) and walking (16%). Public transportation is not available to or within the park. When asked about their willingness to take public transportation to either district if it were offered, most respondents to the visitor survey said they were not willing to take public transportation (David Evans and Associates 2006).

Entrance fees are required for visitors accessing Cactus Forest Drive in the Rincon Mountain District, and since 2005 Tucson Mountain District visitors must also pay a fee when entering the Red Hills Visitor Center. According to the 2003-04 visitor study, about 60% of visitors and 50% of neighbors to the Rincon Mountain District did not pay a fee (David Evans and Associates 2006). Most visitors and neighbors to the Rincon Mountain District that paid a fee used a national park pass (approximately 29% for both visitors and neighbors). When visitors and neighbors to the Rincon Mountain District were asked if they would be willing to pay a fee to access other areas of the park that have no fee requirement (e.g., Broadway trailhead), 47% of visitors and 35% of neighbors said they would be willing to pay a fee. The same question was asked of Tucson Mountain District visitors and neighbors who, at the time of the survey (2003-2004), did not have to pay any fees to access the Tucson Mountain District, and the response was 60% of visitors and 26% of neighbors were willing to pay a fee to access the park (David Evans and Associates 2006).

RANGE OF RECREATIONAL OPPORTUNITIES

A visit to Saguaro National Park allows visitors to come in close contact with the ecologically diverse and incredibly scenic Sonoran Desert. The desert trees and shrubs and the animals of the desert provide spectacular contrasts of

form and color. The varied terrain in both districts of the park provides interesting and challenging recreational opportunities for a wide diversity of visitors. Visitors also have the opportunity to see and learn about ancient Indian art works in several locations throughout the park.

According to the 2003–04 visitor survey, the majority of visitors and neighbors in the Rincon Mountain District went hiking or walking during their visit, followed by scenic driving. Rincon Mountain District neighbors represented the largest percentage of horseback riding (22%) and bicycling (4%) activity, and that district's visitors represented the largest percentage of running activity (12%). The majority of visitors and neighbors in the Tucson Mountain District also went hiking or walking, followed by scenic driving. Similar to the Rincon Mountain District, Tucson Mountain District neighbors represented the largest percentage of horseback riding (15%) and bicycling (3%) activity, and these visitors had the highest participation in running activities (4%)(David Evans and Associates 2006).

In the newsletter comments received during the scoping process for this management plan, most of the respondents mentioned how much they value the high quality of hiking, bicycling, and horseback riding opportunities in the park and the close proximity of these opportunities to a large urban area. Many respondents commented on the high frequency with which they use the park due to its convenience and level of accessibility.

Also in the newsletter comments, reductions in recreation opportunities, specifically trail closures, were one of the main concerns mentioned by respondents. In both *Newsletter 1* and the 2003–04 visitor survey, the level of development on trails in the wilderness areas, specifically rock steps, was frequently mentioned as a concern. Further, both sets of respondents mentioned conflicts between different trail user groups, particularly bicyclists and horseback riders. The most abundant comments regarding user group conflicts on trails was from visitor survey respondents in the Rincon Mountain District that noted their dislike for the amount of horse manure left on trails by horses. Some comments suggested more loop trails and possibly single-use trails to alleviate the user group conflicts.

Backcountry camping is permitted by permit in the Saguaro Wilderness Area in the Rincon Mountain District. This wilderness area consists of 59,930 acres with six wilderness camping areas that are only accessible by foot or horse. All of the camping areas are at least 6 miles from the nearest trailhead, and water is available only seasonally. For the last 10 years (1994–2004), camping activity in the Rincon Mountain District has been relatively constant with an average of 1,600 backcountry overnight stays a year, excluding 2004 which had the highest number of overnight stays at 2,200 for the year (NPS 2004e). To date, there has not been more demand for camping opportunities than supply, and there were no substantial comments received on the park's camping opportunities during the scoping process for this management plan. Saguaro National Park does not offer drive-in camping facilities in either district. Developed camping is available in nearby county and state parks and in Coronado National Forest.

Auto touring is also a popular activity in the park. The 6-mile Hohokam Road begins 1.5 miles northwest of the Red Hills Visitor Center. This loop passes through dense saguaro forest on a graded dirt road. Other through-park roads in the Tucson Mountain District, such as Sandario, Kinney, and Picture Rocks Road, are scenic and also used for auto touring. However, high levels of commuter traffic on these through-park roads continue to be a major concern of the public and park management due to impacts on the visitor experience, visitor safety, and resource conditions. Specifically, high volumes of traffic and speeds on these roads during commuting

hours restrict opportunities for scenic, leisurely driving through the park by visitors. During the scoping process for this plan, respondents complained of tailgating, speeding, and traffic congestion on these roadways. Many of these same respondents acknowledged that these problems would only get worse in the future as the residential area around the Tucson Mountain District continues to grow. The 8-mile Cactus Forest Drive in the Rincon Mountain District winds through the heart of an extensive saguaro forest and offers a close and leisurely look at a variety of Sonoran Desert life. There are no through-park roads in this district.

Bicycling at Saguaro is limited in terms of opportunities and has been a controversial issue in the past. The National Park Service reopened the 2.5-mile segment of Cactus Forest Trail in the Rincon Mountain District to bicycle use in September 2003. All roads within both park districts are also open to bicycle use. According to the 2003–04 visitor survey, about 1% of Tucson Mountain District visitors and 3% of that district's neighbors participated in bicycling while in the park. A similar number of Rincon Mountain District visitors (1%) and neighbors (4%) also participated in bicycling while on their visit (David Evans and Associates 2006). Many respondents during the scoping process for this management plan commented that the park should provide more bicycle trail opportunities, specifically at key locations that would connect regional trails and allow bicyclists to pass through the park. In contrast, there were a fairly equal number of respondents that wanted bicycling to remain relatively restricted in the park citing user conflicts, resource damage, and plentiful bicycling opportunities outside of the park as reasons.

Four picnic areas are along park roads in the Tucson Mountain District. A fifth, in the Tucson Mountain District backcountry can be reached only by trail. Each area has tables, grills, shade ramadas, and pit toilets. Two picnic areas are located along the loop drive in Rincon Mountain District. There is no drinking water at any of the sites. There were not many comments received during the scoping process on the need to increase picnic facilities in either district.

OPPORTUNITIES FOR SOLITUDE AND GETTING IN TOUCH WITH NATURE

The park provides outstanding opportunities for solitude and getting in touch with nature. In *Newsletter 1* and visitor survey, many respondents indicated that the wilderness values of the national park, such as naturalness, opportunities for self-discovery, quiet, scenic vistas, and solitude, made the park a unique and special place and it should be protected for such values. People appreciate the scenery, views, and open space, and the serenity, peace, and relaxation those conditions bring. Many respondents mentioned the magical beauty of the desert in the changing seasons as well as the diversity of ecotypes that can be explored while traversing the park's trail system. Many suggested that the park provides a needed escape from the developing urban environment in the region. Many respondents also noted that the park's proximity to the growing population of Tucson may make protecting these values more difficult due to increasing use levels, demands for new activities, and increasing urbanization along the park boundary. Some noted specific concerns over future overuse, crowding, loss of natural quiet, and interruption of the park's scenic viewsheds.

OPPORTUNITIES FOR ORIENTATION, EDUCATION, AND INTERPRETATION

There are many opportunities for orientation, education, and interpretation within both districts of Saguaro National Park. Numerous guided walks are offered at each visitor center. Published schedules of programs are available

during the winter season. Special environmental education programs are frequently conducted for local school groups. Several Junior Ranger Programs are available. Exhibits in the Rincon and Tucson Mountain Districts' visitor centers focus on the natural and cultural history of the Sonoran Desert. "A Home in the Desert," a fifteen-minute orientation program to Saguaro National Park, is shown throughout the day at the Rincon Mountain District visitor center and "Voices of the Desert," a 15-minute program exploring the Native American perspective of the Sonoran Desert, is shown throughout the day at the Tucson Mountain District visitor center. If visitors would like to identify the cactus they see while exploring the park, the cactus gardens at both visitor centers offer interpretive signs that identify many of the common cacti found in the park.

The Desert Ecology Trail is a paved 0.25-mile wheelchair accessible loop located near the Mica View Picnic Area. Interpretive signs explain how plants and animals use the limited water resources of the Sonoran Desert.

The Freeman Homestead Nature Trail is a 1-mile loop trail located near the Javelina picnic area. Interpretive signs discuss early and modern Tucson as well as homesteading in the desert during the late 1800s and early 1900s.

During the public scoping period for this management plan, the public noted the need for improvements to the visitor center in the Rincon Mountain District due to its small size and outdated exhibits. Further, the public commented on their enjoyment and appreciation of the newer, more modern Tucson Mountain District visitor center. Additional comments from the public on interpretive facilities and programs included suggestions for a research/learning center at Madrona, increased interpretation of cultural resources, more guided walks, and more park-related programs in the schools. In addition, the public noted the need for more signs for mile markers, trail etiquette, and the park's flora and fauna. The benefits of increased coordination of environmental programs in the region were also noted.

VISITOR ACCESS, INCLUDING ACCESS FOR VISITORS WITH DISABILITIES

The park has two main access points to both units near the each of the main visitor centers. In addition, there are several trailhead access points around the park boundary to provide access to the park's trail systems and day-use picnic areas. During the scoping process for this management plan, some respondents expressed concerns over high levels of use and access to certain portions of the park's wilderness. There was some discussion about increasing access from nondesignated locations along the park's boundary by neighbors to the park that might damage resources and increase conflicts between park users. In contrast, a number of respondents stated that the park needs additional access points, especially in some of the park's expansion areas, to provide much needed access.

There were also comments received on the need to improve access at a few existing trailheads in the park, particularly the Broadway and Speedway parking areas along the Rincon Mountain District boundary. Both sets of respondents commented on the congestion and user conflicts at these trailheads. Both trailheads have limited formal parking, which leads to haphazard parking of automobiles and horse trailers along the roadside, creating visitor safety conflicts and adversarial relations between user groups.

There were also comments requesting increased public access to the Madrona area. This incredibly scenic and sensitive riparian area has been largely off-limits to visitors for many years due to the restricted road access from the adjacent gated community. The area can only be accessed by park visitors if they are willing to travel more than 15 miles on foot

or horseback. The residents of the gated community are the only people with close and easy access to the site. Although many respondents noted an interest in more access, there was an even higher number of respondents that requested that access to the site remain highly regulated, although not off-limits, to preserve the sensitive resources and scenic beauty of the area.

Another visitor access related topic of interest for the local and regional public is connection of the city and county's regional trail system to key locations in both districts. Specifically, comments were received about regional trail connections to the south expansion area of the Rincon Mountain District and the east expansion area of the Tucson Mountain District.

Visitor centers, orientation programs (captioning available by request), bookstores, restrooms, picnic areas, cactus gardens, and one interpretive trail in each district are accessible by disabled visitors. There are six picnic areas in Saguaro National Park that can be reached by vehicle. Each of these picnic areas has one table with an overhang and a wheelchair accessible pit toilet. There was some mention about the need for more universally accessible nature trails in both districts.

REGIONAL RECREATIONAL OPPORTUNITIES

Actions in the alternatives could affect visitor use in other nearby recreational areas. For example, providing new recreational opportunities, particularly trail opportunities that connect the park to regional trail systems or other public lands, could encourage use at Saguaro as well as at other recreation areas. Further, if restrictions were placed on visitor use levels or activities at the park, this could displace some visitors who might decide to visit other areas in the region. Depending on the number of people who were displaced from the park, the visitor experiences offered in the surrounding areas and management of the areas could be affected. Other nearby regional recreational opportunities are outlined below.

Arizona-Sonora Desert Museum

The Arizona-Sonora Desert Museum is a world-renowned zoo, natural history museum, and botanical garden. The museum is very near the southern boundary of the Tucson Mountain District. Exhibits re-create the natural landscape of the Sonoran Desert Region with more than 300 animal species and 1,200 kinds of plants. There are almost 2 miles of paths traversing the 21 acres, as well as two gift shops, a small picnic area, two restaurants, a coffee bar, and an ice cream shop.

Tucson Mountain Park

Tucson Mountain Park is 22,000 acres managed by Pima County. The park borders the southern boundary of Saguaro's Tucson Mountain District. The park includes the Arizona-Sonora Desert Museum and Old Tucson. It is estimated that the county park receives 1.5 million visitors annually. According to conversations with the park manager, most of the visitors to the park are coming to visit the Desert Museum or Old Tucson. Most other visitors are engaged in trail activities or watching the sunset on Gates Pass. There are 26 miles of designated multiuse trails in the park for hiking, bicycling, and horseback riding. Archery hunting is another activity permitted in the park. The park also has a developed 130-site campground that receives up to 95,000 campers per year. Approximately 95% of campers are winter visitors and are retirees, and about 50% of the campers are repeat visitors. According to the park manager, the park has a good reputation for its campground due to the amenities and well-buffered sites (Mark Brossel, Supervisor of Tucson Mountain Park,

pers. comm. with Kerri Cahill, NPS Denver Service Center, January 24, 2003). Other facilities include three picnic areas with limited amenities.

The county park has similar concerns and problems as Saguaro National Park with commuting traffic on Gates Pass Road and Kinney Road. Commuter traffic is impacting visitor experiences and natural resources in the park. In addition, the county park is experiencing similar degrees of high intensity development along park edges that is a concern for protecting resources and visitor experiences (personal communication, Mark Brossel, Supervisor of Tucson Mountain Park, January 24, 2003).

Ironwood Forest National Monument

Ironwood Forest National Monument is about 130,000 acres managed by the Bureau of Land Management. The monument is close to the west side of Saguaro's Tucson Mountain District. The monument protects one of the richest stands of Ironwood trees and a significant system of cultural and historical sites covering a 5,000 year period. Main activities include wildlife viewing, scenic driving, hunting, hiking, bicycling, horseback riding, and camping. There are no visitor services in the monument at this time.

Coronado National Forest

The Santa Catalina Ranger District of the Coronado National Forest covers nearly a quarter million acres near Tucson, Arizona. This district of the forest surrounds the Rincon Mountain District on the north, east, and south sides. There are five developed campgrounds, the Santa Catalina Highway, numerous picnic areas, two visitor centers, and an adjacent wilderness area in this national forest district. The district has more than 20 developed picnic areas with almost 400 sites, each with a table, a metal grill, or a fire ring. Main activities include hiking, camping, horseback riding, mountain biking, picnicking, hunting, and rock climbing. In Coronado National Forest, all roads and trails outside wilderness areas (except when posted closed) are open to bicycles. In addition, all forest roads and trails (except when posted closed) are open to horseback riding.

Recreational use of the forest for fiscal year 2001 was about 2.23 million visits (U.S. Forest Service 2002). However, it is important to note that this data is for all Coronado National Forest districts. In addition, the data is considered to be a low estimate due to several weather-and traffic-related issues that occurred during the survey season.

Colossal Cave Mountain Park

The Colossal Cave Mountain Park is near the southern boundary of the Rincon Mountain District. Major attractions at the site include tours of the cave, picnicking, camping, and guided trail rides.

Catalina State Park

Catalina State Park is near the northern boundary of the Rincon Mountain District. The park offers camping, hiking, picnicking, bicycling, horseback riding, plant and wildlife viewing, and an archeological site in a scenic desert setting spanning more than 5,000 acres. The park is in Coronado National Forest and is managed by Arizona State Parks in cooperation with the U.S. Forest Service.

Cienega Creek Natural Preserve

The Cienega Creek Natural Preserve is managed by Pima County Natural Resources, Parks and Recreation and is near the southern boundary of the Rincon Mountain District. The preserve is an exceptional area for wildlife viewing opportunities. Permits are required for daily entry.

SOCIOECONOMIC ENVIRONMENT

The social and economic context in which planning decisions for Saguaro National Park occur is characterized by the needs, demands, and values of the local, regional, and national publics as well as the economic opportunities, benefits, and constraints that are represented by the national park. Economic and social statistics that are regularly collected can be compiled in a manner that provides this context for the park as (1) a measurable comparison of factors that characterize these needs, demands, and values and (2) economic indicators that describe or predict changes and trends in society. These statistics can provide data that documents historical trends, current conditions, or projections into the future.

For the purposes of this document, socioeconomic indicators have been studied on the community, county, and state level. Local factors are represented by the following communities immediately surrounding the national park:

- City of Tucson — the largest community studied in this analysis, located between the Rincon Mountain and Tucson Mountain Districts of Saguaro National Park
- Town of Marana — located north of the Tucson Mountain District
- Avra Valley Community — represented by Census Tract 44.09 and the expanded area west of Avra Valley Census Designated Place (CDP), located near the Tucson Mountain District
- Rincon Community — represented by Census Tract 40.61, which encompasses the Rincon Mountain District and surrounding areas

Data from Pima County and Arizona as a whole is provided as appropriate for comparative evaluation and to detail the larger context in which NPS decisions will occur.

Socioeconomic indicators evaluated herein are consistent with the report, *A Socioeconomic Atlas for Saguaro National Park and its Region* (NPS 2004a) and include the following:

- general population indicators, which measure the demographic characteristics of the people living in the vicinity of the national park, the number of persons living in the area, where and how densely the population is concentrated, and how they travel to work
- social and cultural indicators, including race and ethnicity and other factors, to help define the identity of a population
- economic indicators, which measure the flow and distribution of money, materials, and labor
- recreation and tourism indicators, which measure park visitation and other activities specifically related to the economic impact of recreation and tourism
- "sense of place" indicators, which identify the link between social experiences and geographic areas

POPULATION INDICATORS

Current and projected population changes affect the management of Saguaro National Park in terms of the scope and volume of demands for different uses and the perceived value of opportunities provided by the park. Locally, increased population generally suggests an increase in park use. On a larger scale, population growth creates an increased tax base, adds new voters, and increases demand for public services at all levels. To demonstrate the characteristics for the study area population, data from the U.S. Census 2000 have been compiled and the results are presented in Table 13. Demographic data presented include population numbers and density, gender, age, and race and ethnicity.

TABLE 13. SELECTED 2000 CENSUS DEMOGRAPHIC INFORMATION

	City of Tucson		Town of Marana (north of Tucson Mtn. District)		Census Block 44.09 (north/west of Tucson Mtn. District)		Census Block 40.61 (Rincon Mtn. District)		Pima County		Arizona	
Total Population	486,699		13,556		9,397		2,047		843,746		5,130,632	
Persons per Square Mile	390.3		41.3		23.4		6.1		91.8		45.2	
Housing Units per Square Mile	168.9		15.9		N/A		N/A		39.9		19.3	
Gender	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
Male	238,408	49.0	6,791	50.1	4,756	50.6	1,049	51.2	412,562	48.9	2,561,057	49.9
Female	248,291	51.0	6,765	49.9	4,641	49.4	998	48.8	431,184	51.1	2,569,575	50.1
Age												
Under 20 Years	139,499	28.6	3,895	28.7	2,985	31.8	674	32.9	235,880	28.0	1,518,188	29.7
20 to 64 Years	289,372	59.4	8,367	61.7	5,676	60.4	1,235	60.3	488,379	57.9	2,944,605	57.5
Age 65 and Older	57,828	11.9	1,294	9.5	736	7.8	138	6.7	119,487	14.2	667,839	13.0
Median Age	32.1	NA	34.5	NA	36.0	NA	36.6	NA	35.7	NA	34.2	NA
Race and Ethnicity												
White	341,424	70.2	11,094	81.8	8,388	89.3	1,823	89.1	633,387	75.1	3,873,611	75.5
Black or African American	21,057	4.3	392	2.9	52	0.6	9	0.4	25,594	3.0	158,873	3.1
American Indian/ Alaska Native	11,038	2.3	286	2.1	138	1.5	17	0.8	27,178	3.2	255,879	5.0
Asian	11,959	2.5	334	2.5	35	0.4	10	0.5	17,213	2.0	92,236	1.8
Native Hawaiian/ Other Pacific Islander	796	0.2	20	0.1	11	0.1	4	0.2	1,088	0.1	6,733	0.1
Some other race	81,988	16.8	1,014	7.5	546	5.8	122	6.0	112,217	13.3	596,774	11.6
Two or more races	18,437	3.8	416	3.1	227	2.4	62	3.0	27,069	3.2	146,526	2.9
Hispanic or Latino (any Race)	173,868	35.7	2,663	19.6	1,333	14.2	309	15.1	247,578	29.3	1,295,617	25.3

SOURCES: U.S. Census Bureau 2006a, 2006b

NOTES: NA = Not available.
Numbers may not add due to rounding.

Population density reported in the Census 2000 varies substantially within the study area. Pima County's population density of 91.8 persons per square mile is about twice the statewide average of 45.2 persons per square mile. Conversely, the city of Tucson has an average of 390.3 persons per square mile. These numbers are indicative of the urbanization in the Tucson metropolitan area as compared to Pima County's more rural environment (U.S. Census Bureau 2006c). The town of Marana, with a 2000 population density of 41.3 persons per square mile, is similar in density to that of the state as a whole.

Gender distribution among the state, county, city of Tucson, town of Marana, and the census tracts surrounding Saguaro National Park is similar; all areas have a relatively equal gender distribution of roughly half female and half male. The median age in all of the entities except the city of Tucson is slightly higher than that of the state, and there is the greatest percentage of persons under 20 in the newly developed areas west of the national park's Tucson Mountain District and south of the Rincon Mountain District. Pima County has the highest percentage of people age 65 and older (14 percent), followed by the state of Arizona and the city of Tucson at 13% and 12%, respectively. Only 2% of Arizona's population was of retirement age in 1990, but by 2000 this number increased to 21% (NPS 2004a).

Population growth in Arizona and specifically in the area around Saguaro National Park is an important socioeconomic trend. Although population growth has tapered off slightly statewide, in Pima County, and in the city of Tucson, growth in the town of Marana and the census tracts near the national park's districts has increased substantially. As shown in table 14, historical population growth in Marana has increased by 11,369 persons since 1990, where a growth rate of 520% has been realized during the decade. Census tract 44.09, located near the Tucson Mountain District and representing the Avra Valley area, has increased by 5,419 persons since 1990, resulting in an 88.8% growth rate during the decade. No population information was available for census tract 40.61 before the 2000 census, indicating that this is a new area of growth and development.

Projected population growth figures for the United States, Arizona, and Pima County are presented in table 15. According to population projections issued by the Arizona Department of Economic Security and the U.S. Census Bureau, the state of Arizona is expected to experience a growth of 43.9% between 2005 and 2025. Growth in Pima County over the same timeframe is expected to increase by 36.8%. Both of these figures are substantially higher than the projected growth of the nation as a whole, at 17.4%.

Table 16 shows the housing characteristics within the study area. Pima County has experienced a 23% growth in housing units since 1990, which is double that of the city of Tucson (14.3%). The percentage of housing units has increased in Arizona by 31.9%, more than twice that of the national average. During this same time period, the number of housing units in Marana has more than quintupled (570.8%). The area with the greatest density of housing units per square mile is Tucson, which demonstrates its urban status. Conversely, housing density in Marana at 15.9 housing units per square mile suggests a more residential community development (U.S. Census Bureau 2000a).

Rental affordability may be measured by median gross rent as a percent of household income; this totaled 25% in Marana. The affordability of owner-occupied housing may be measured through a housing affordability index. In Marana, this index suggests that the median family can afford the median house. Overall, housing in the area

TABLE 14. HISTORICAL POPULATION GROWTH

	Historical Population Growth				Rate of Change		
Geographic area	**1970**	**1980**	**1990**	**2000**	**1970 to 1980**	**1980 to 1990**	**1990 to 2000**
Arizona	1,770,900	2,718,215	3,665,228	5,130,632	53.5	34.8	40.0
Pima County	351,667	531,443	666,957	843,746	51.1	25.5	26.5
City of Tucson	267,418	330,537	405,390	486,699	23.6	22.6	20.1
Town of Marana	NA	NA	2,187	13,556	NA	NA	520.0
Avra Valley area (Census Block 44.09, Tucson Mountain District)	NA	NA	4,978	9,397	NA	NA	88.8
Rincon area (Census Block 40.61, Rincon Mountain District)	NA	NA	NA	2,047	NA	NA	NA

SOURCE: U.S. Census Bureau 2006b

TABLE 15. PROJECTED POPULATION GROWTH

	Baseline Population	Projected Population Growth		Rate of Change by Decade		Total Rate of Change
Geographic Area	**2005**	**2015**	**2025**	**2005 to 2015**	**2015 to 2025**	**2005 to 2025**
United States	287,716,000	312,268,000	337,815,000	8.5	8.2	17.4
Arizona	5,553,849	6,744,754	7,993,039	21.4	18.4	43.9
Pima County	943,795	1,119,342	1,290,996	18.6	15.3	36.8

SOURCE: U.S. Census Bureau 1997, 2003b; ADES 2003

TABLE 16. HOUSING CHARACTERISTICS

Housing Characteristics	City of Tucson	Town of Marana	Census Tract 40.61	Census Tract 44.09	Pima County	Arizona
Total Housing Units 1990	183,338	850	NA	2,012	298,207	1,659,430
Total Housing Units 2000	209,609	5702	798	3,630	366,737	2,189,189
Percent Change 1990 to 2000	14.3%	570.8%	NA	80.4%	23.0%	31.9%
Average household size of owner-occupied units	2.58	2.69	2.92	2.81	2.62	2.71
Average household size of renter-occupied units	2.24	2.48	1.90	2.67	2.21	2.48
Percent of housing units used for seasonal, recreational, or occasional use (2000)	1.7%	3.9%	2.1%	1.5%	2.9%	6.5%
Homeowner vacancy rate	1.6%	3.6%	3.0%	2.0%	1.8%	2.1%
Rental vacancy rate	8.1%	21.7%	11.1%	7.2%	9.2%	9.2%
Housing units per square mile	168.9	15.9	N/A	N/A	39.9	19.3

SOURCE: U.S. Census Bureau 2000a, 2006c
NOTE: N/A= not available.

around Saguaro National Park generally is affordable for the population (U.S. Census Bureau 2000a).

Migration and residential stability figures define the movement of populations in a community. The foreign-born population in Arizona represented 13% of the total population in 2000. From 1995 to 2000, Arizona (at 74.3%) had the second highest rate of net domestic immigration and nearly one-third of this immigration was from California (U.S. Census Bureau 2003a). In addition, the U.S. Immigration and Naturalization Service estimate that 283,000 or 5.5% of Arizona's 2000 population was unauthorized residents. By comparison, the estimated 7 million unauthorized immigrants living in the United States in 2000 constituted 2.5% of the total U.S. population of just over 281 million (U.S. Immigration and Naturalization Service 2003).

Generally, the longer people have lived in a community, the greater their connection to community and social groups as well as the land (Harp et al. 2001). In 2000, 77.3% of the residents in Pima County lived in the same house or same county as they did five years prior, compared to a lower rate of 74.9% for Arizona. The rate of residents of Marana who, in 2000, lived in the same house as they did five years prior is 24%; 33% lived in a different state in 1995 (U.S. Census Bureau 2000a). This most likely reflects the recent growth of this community.

Most Americans (75.7%) drove alone to work in 2000. The U.S. mean travel time to work in 2000 was 25.5 minutes. The travel time to work for Arizona in 2000 was 24.9 minutes. Travel time in Pima County (at 23.9 minutes) was lower than the U.S. mean. The per capita vehicle miles traveled in 2000 in Pima County at 20.5 miles was less than that of Arizona at 26.2 miles (U.S. Census Bureau 2000a).

In Marana, only 18% of residents work in town, and 21% of residents have a commute time of less than 20 minutes. The majority (61%) commute to work for between 20 and 45 minutes. Based on this information and Marana's location, it is plausible that many residents work in the Tucson metropolitan area (U.S. Census Bureau 2000a). According to a preliminary traffic study conducted for the National Park Service by David Evans and Associates (David Evans and Associates 2006) for the period from 1999 to 2004, an average of approximately 7,500 vehicles per day passed along Picture Rocks Road, the major east-west thoroughfare through the park's Tucson Mountain District (Pima County DOT 2006, NPS public workshop handouts that were partially based on David Evans and Associates 2006).

SOCIAL AND CULTURAL INDICATORS

Social and cultural indicators, including race and ethnicity, help define a group's identity. The relatively newly developed communities including Marana and the census tract areas surrounding the two national park districts are also distinguishable in terms of racial characteristics. These populations have a greater percentage of white persons (81.8%, 89.3%, and 89.1%, respectively, versus 70.2% in Tucson, 75.1% in Pima County, and 75.5% statewide), and a lower percentage of black or African American persons (2.9%, 0.6%, 0.4% versus 4.3% in Tucson, 3.0 % in Pima County, and 3.1% statewide). Percentages of other races closely follow this trend, with the exception of a higher percentage of Asians residing in Marana than in any of the other areas.

Hispanic or Latino origin statistics represent ethnicity (not race) and include all persons who identify themselves as of Hispanic or Latino origin or descent. Within the study area, Tucson has the highest percentage of persons who identify themselves as being of Hispanic or Latino origin (35.7%). In Pima County, 29.3% of the people identify

themselves of this origin, slightly more than the 25.3% statewide percentage. Marana and the two census tracts located near the national park's districts have somewhat smaller percentages of persons who identify themselves as Hispanic or Latino, with numbers at 19.6%, 14.2% and 15.1%, respectively. In 2000, Arizona's Hispanic proportion of the population was 25%, double the national average (ADOC 2002a).

Educational attainment levels in a community may affect per capita income and other economic indicators. Rates of attainment of a high school education or above in 2000 were higher in Pima County (83.4%) than the statewide average of 81.0%. The percentage of the population with a high school degree in Marana and the surrounding Avra Valley area are 22% and 28%, respectively. In Tucson, 24% of the population held a high school degree. Similarly, in 2000 the percentage of the population in Pima County with four years of college or bachelor's degree or above was 27%, compared with 24% in Arizona. In Marana and Tucson, these percentages were 29% and 23%, respectively (U.S. Census Bureau 2000a). (Note: educational attainment figures are a percentage taken from individuals older than 25 years of age.)

ECONOMIC INDICATORS

Overall, social and economic trends over the past 30 years indicate a shift among the dominant employment sectors and the major sources of personal income. As shown in Table 17, employment in Pima County over the past 30 years has been characterized by a large increase in the jobs centered in the Services and Professional sector, which accounted for approximately 72% of new jobs. This trend is statewide; over the past 30 years, the Services and Professional sector has provided approximately 75% of the new jobs in Arizona. Conversely, employment in the Mining sector has declined in terms of both relative significance and total number of jobs. New job growth in the Government sector has also occurred over the 30-year timeframe. The Farm and Agricultural Services sector remained relatively flat in Pima County.

From 1970 to 2000, Pima County added over $14 billion in personal income, in real terms. Of that new income, nonlabor sources accounted for 43%. In 1970 nonlabor income sources represented 30% of the total personal income, but by 2000 these sources comprised approximately 39% of personal income. Nonlabor income in Pima County exceeds the rate of growth in Arizona as a whole, where nonlabor income represented 34% of new income between 1970 and 2000.

The employment figures in table 17 generally correlate with industry income figures for the labor categories. However, there is another source of income from nonlabor categories, which includes transfer payments (primarily related to retirement) and dividends, interest, and rent (money earned from past investments). When evaluated in these terms, nonlabor income is the fastest growing source of income and the Services and Professional sector is the second fastest growing source of income in Pima County. The increase in the percentage of nonlabor income suggests that the area is attracting retirees.

TABLE 17. PIMA COUNTY EMPLOYMENT BY INDUSTRY: CHANGES FROM 1970 TO 2000

	1970	Percent of Total	2000	Percent of Total	New Employment[1]	Percent of Jobs Gained[2]
Total Employment	**144,273**	**-**	**444,118**	**-**	**299,845**	**-**
Wage and Salary Employment	126,320	87.6	363,641	81.9	237,321	79.1
Proprietors' Employment	17,953	12.4	80,477	18.1	62,524	20.9
Farm and Agricultural Services	**2,054**	**1.4**	**5,983**	**1.3**	**3,929**	**1.3**
Farm	1,087	0.8	955	0.2	-132	NA
Agricultural Services	967	0.7	5,028	1.1	4,061	1.3
Mining	**6,972**	**4.8**	**2,410**	**0.5**	**-4,562**	**NA**
Manufacturing (including forest products)	**9,295**	**6.4**	**35,144**	**7.9**	**25,849**	**8.5**
Services and Professional	**78,120**	**54.1**	**297,840**	**67.1**	**219,720**	**72.1**
Transportation	5,872	4.1	14,504	3.3	8,632	2.8
Wholesale Trade	3,514	2.4	12,581	2.8	9,067	3.0
Retail Trade	25,342	17.6	73,947	16.7	48,605	16.0
Finance, Insurance and Real Estate	10,947	7.6	37,386	8.4	26,439	8.7
Services (Health, Legal, Business, Others)	32,445	22.5	159,422	35.9	126,977	41.7
Construction	**11,064**	**7.7**	**28,081**	**6.3**	**17,017**	**5.6**
Government	**36,768**	**25.5**	**74,660**	**16.8**	**37,892**	**12.4**

SOURCE: BEA 2000

NOTES: [1] New employment includes new jobs less job losses.

[2] The percentage of new employment for each sector is the proportion of new jobs added.

[3] Numbers may not add up due to rounding.

Information on per capita and household income, unemployment, and poverty within the study area is provided in table 18. Marana and the census tracts surrounding the national park districts have substantially higher per capital and household income than the city of Tucson, Pima County, and the state as a whole. Poverty rates in Tucson are substantially higher than in Marana and the census tracts around the national park, and these rates are somewhat higher than the county and the state.

TOURISM AND RECREATION INDICATORS

The National Park Service recorded a total of 3,629,550 visitors to Saguaro National Park in 2005. Of these, 727,208 were recreational visitors and 2,902,342 were nonrecreational visitors. Total visitation at the park has increased approximately 71.3% since 1990 (NPS 2006f). The typical peak period of visitation at the park is January through March, when the southern Arizona weather is mild. July and August typically have lower visitation due to the extreme heat in the Sonoran Desert. Most park visitors participate in day activities such as hiking, walking, horseback riding, scenic driving, and educational programs; other visitors stay for extended time periods and include overnight camping in a rugged wilderness setting. There were 1,447 backcountry/overnight visitors during 2005, which represents less than 1% of the total recreational visitors. Table 19 summarizes the visitation to Saguaro National Park since 1979 (NPS 2006f, NPS public workshop handouts that were partially based on David Evans and Associates 2006).

TABLE 18. GENERAL INCOME, UNEMPLOYMENT, AND POVERTY CHARACTERISTICS

	Tucson	Marana	Census Tract 40.61	Census Tract 44.09	Pima County	Arizona
Per capita personal income 1999	$16,322	$22,408	$20,881	$17,250	$19,785	$20,275
Median household income 1999	$30,981	$52,870	$52,404	$44,744	$36,758	$40,558
Unemployment Rate 2000	4.1%	4.6%	NA	NA	5.3%	5.6%
Number of persons below poverty level 1999	86,532	810	64	749	120,778	698,669
Poverty rate among individuals (%) 1999	18.4%	6.2%	3.2%	8.1%	14.7%	13.9%

SOURCE: ADOC 2003b; U.S. Census Bureau 2006d

TABLE 19. SAGUARO NATIONAL PARK VISITATION FROM 1979 THROUGH 2005

Year	Recreational Visits	Non-Recreational Visits	Total Visits	Back Country Campers	Total Overnight Stays
1979	566,486	0	566,486	3,622	3,622
1980	611,317	0	611,317	3,881	3,881
1981	470,598	0	470,598	3,144	3,144
1982	566,807	796,946	1,363,753	2,799	2,799
1983	634,688	983,195	1,617,883	2,714	2,714
1984	699,292	972,349	1,671,641	2,301	2,301
1985	636,711	1,637,820	2,274,531	1,834	1,834
1986	613,651	1,199,153	1,812,804	1,796	1,796
1987	689,933	1,299,934	1,989,867	1,549	1,549
1988	675,397	1,451,151	2,126,548	1,822	1,822
1989	706,191	1,485,758	2,191,949	1,247	1,247
1990	702,328	1,416,160	2,118,488	1,129	1,129
1991	679,034	1,451,891	2,130,925	1,516	1,516
1992	810,059	1,567,787	2,377,846	1,523	1,523
1993	828,267	1,653,330	2,481,597	1,593	1,593
1994	768,685	2,040,105	2,808,790	1,501	1,501
1995	732,813	2,203,373	2,936,186	1,539	1,539
1996	671,643	2,103,595	2,775,238	1,573	1,573
1997	739,410	2,007,488	2,746,898	1,592	1,592
1998	716,160	2,593,876	3,310,036	1,839	1,839
1999	749,014	2,675,037	3,424,051	1,594	1,594
2000	765,195	2,633,397	3,398,592	1,560	1,560
2001	725,874	2,599,632	3,325,506	1,683	1,683
2002	615,045	2,822,786	3,437,831	1,424	1,424
2003	643,697	2,834,381	3,478,078	1,208	1,208
2004	651,464	2,950,311	3,601,775	2,203	2,203
2005	727,208	2,902,342	3,629,550	1,447	1,447

SOURCE: NPS 2006f

Both the Rincon Mountain and Tucson Mountain districts provide exceptional opportunities for visitors to experience solitude, develop a close interaction with the environment, and enjoy the diverse scenic features of the desert landscape. Due to the proximity of the park to surrounding communities, including Tucson, many of the visitors are local to the area and visit the park often. However, many people travel from other parts of the state and nation to visit the park, bringing substantial recreational and tourism dollars to the area.

Statewide, tourism is an important part of the Arizona economy. According to information provided by the Arizona Office of Tourism, there were 29.5 million domestic and international overnight visitors and 19.3 million day trip visitors to Arizona in 2000. Spending by these visitors created direct, indirect, and induced jobs. Direct jobs are those that relate directly to tourism expenditures, both at tourist sites and in the surrounding community. Indirect jobs are those created in sectors beyond tourism-related firms as a result of tourism spending. Induced jobs are those created as a result of household spending that occurs from income earned in a directly or indirectly affected industry. Total direct visitor spending in 2000 was $13.8 billion and $2.0 billion for day trip visitors. This spending generated about 451,600 total direct, indirect, and induced jobs, and the economic impact of these visitors is estimated to be nearly $30 billion. In addition, the fiscal impact (revenues from local, county, and state government taxes) totaled $1.3 billion. Tourist spending is considered "new" dollars injected into the economy each year because nonlocal dollars are used in spending on hotels, restaurants, retail shops, car rental agencies, and similar outlets (Pollack 2002).

A study conducted for Arizona Game and Fish Department found the total economic effect (including secondary effects) from 2001 watchable wildlife activities in Arizona to be $1.5 billion ($1.1 billion by residents and $434.7 million by nonresidents) (Southwick Associates 2003). Arizona resident expenditures for watchable wildlife recreation in 2001 totaled $594.5 million, and nonresident expenditures totaled $226.2 million. In addition to this statewide data, this study provided county-based estimates of the economic impact of watchable wildlife recreation in 2001. Table 20 includes the county-level data applicable to Saguaro National Park.

TABLE 20. ECONOMIC IMPACTS FROM ALL WATCHABLE WILDLIFE RECREATION IN PIMA COUNTY IN 2001 (PARTICIPANTS 16 YEARS OLD AND OLDER)

	County Residents	Residents from Other Counties	Visitors from Other States	TOTAL[1]
Retail Sales	$85,322,023	$36,240,245	$51,982,423	**$173,544,691**
Total Multiplier Effect	$158,809,428	$67,834,927	$99,891,973	**$326,536,328**
Salaries and Wages	$44,645,190	$19,140,009	$26,941,109	**$90,726,309**
Full- and Part-Time Jobs	1,454	635	1,107	**3,196**
State Sales and Fuel Tax Revenues	$4,856,514	$2,029,235	$3,022,361	**$9,908,109**
State Income Tax Revenues	$1,150,771	$495,093	$621,958	**$2,267,822**
Federal Income Tax Revenues	$8,072,475	$3,470,619	$4,277,017	**$15,820,112**

SOURCE: Southwick Associates 2003

NOTE: [1] Some totals may vary due to rounding.

SENSE OF PLACE INDICATORS

Galliano and Loeffler (1999) define a sense of place as a "link between social experiences and geographic areas." Understanding sense of place issues assists land managers in understanding resource and land use conflicts and how to approach them most effectively. Qualities that contribute to sense of place may include personal memory, community history, physical landscape appearance, and emotional attachment (Galliano and Loeffler 1999). Sense of place is subjective, and individual people may develop a sense of place based on perceptions about amenities (such as recreational opportunities), historic or symbolic activities and places, or landscape and scenic vistas.

Public and partner workshops and comments received on the *Alternatives Newsletter* (NPS 2005c) provided input as to the issues that most concern the public and stakeholders. Major concerns included the need for protection of the ecological landscape (e.g., wildlife and habitat), reduction of habitat fragmentation, and the threat of urban encroachment and overuse of the national park diminishing the qualities of solitude, quiet, and naturalness. Recreational activities that occur in the national park are varied, with different types of users expressing their perceptions of the purpose of public lands with different responsibilities, such as the responsibility to maintain public land in as natural a state as possible, or to maximize access and use for the public. Finally, the maintenance and protection of cultural and symbolic archeological sites are identified as an important part of the area's heritage and lifestyle.

TRANSPORTATION

Transportation has been identified by the park as a major issue for this plan, with management action needed to improve park resources management, administrative operations, and visitor experience (mostly in the Tucson Mountain Unit). David Evans and Associates studied existing transportation conditions (*Saguaro National Park Transportation and Visitor Use Study* 2006) in the park. This study provides detailed information on traffic operations, safety, parking use and capacity, visitation patterns, etc. that support the information in this section.

More than 90% of visitors use private automobiles to get to and around the park; however, many neighbors access the park on horses, on bikes, or on foot. Auto-touring is a popular activity in the park. Bicycling is limited in terms of opportunities and has been a controversial issue in the past. Many respondents during the scoping process commented that the park should provide more bicycle trail opportunities, specifically at key locations that would connect to regional trails and allow bicyclists to pass through the park. Horseback riding and hiking (most visitors and neighbors go hiking or walking during their visit) are frequent visitor activities. Many respondents during the scoping process stated that they valued the high quality of hiking, bicycling, and horseback riding opportunities in the park and the proximity of the park to the urban area, and that they used the park often.

TUCSON MOUNTAIN UNIT

During the scoping process for this plan, many respondents complained of tailgating, speeding, and traffic congestion on roads in this district. Many also agreed that these problems would likely worsen in the future, as residential growth in the area around the park is likely to continue.

Roadway Network

Interstate 10 is the backbone of the regional roadway network. Interstate 10 forks in South Tucson and becomes I-10 and I-19. State Highway 86 (Ajo Highway) is more than 2 miles south of the park. These highways provide indirect access to the park and other nearby high-visitation tourist sites such as the Old Tucson Studios and the Arizona-Sonora Desert Museum. The number of east-west corridors linking Western Pima County and central Tucson is severely limited, which has put strong pressure on local access roads such as Picture Rocks Road.

There are four access points to the park: Avra Valley Road, Picture Rocks Road, Kinney Road, and Sandario Road. Picture Rocks Road connects the park to central Tucson via Ina Road, a major arterial for local commuters. Kinney Road, which connects to Ajo Highway and then to I-19, is a major arterial. Gates Pass Road connects to Speedway Boulevard in central Tucson. However, the county is attempting to move traffic off of this route due to overuse. Sandario Road, which borders the park on the east, connects to Kinney Road and then to Highway 86. The most typical visitor routes are I-19 to Kinney Road from the east or Avra Valley Road to Sandario Road to Kinney Road from the west. There is no entrance station and there are no traffic delays during the fee paying and orientation process.

Most roads and intersections in and near the park are operating at level of service "C" (acceptable operating conditions) or above, with additional roadway capacity available (David Evans and Associates 2006).

TABLE 21. SUMMARY OF TUCSON MOUNTAIN DISTRICT ROADS

Road	Width (feet)	Paving	Speed	Character	Users
Picture Rocks Road	25	Paved	35 mph (curves as low as 15 mph)	Scenic, arterial	Primarily non-user visitors (commuters), visitors
Golden Gate Road	Varies 12 to 20	Unpaved	25 mph	Scenic	Visitors
Kinney Road	16	Chip and seal	25 mph	Scenic, visitor center access	Visitors, some non-user visitors (commuters)
Hohokam Road/Bajada Loop Drive	Varies, 16 feet average	None	Unposted	Scenic, loop drive, mostly one way	Visitors
Sandario Road	24	Paved	50 mph	Arterial	Non-visitor users (commuters) and visitors

Picture Rocks Road

The park has special concerns regarding management and use of Picture Rocks Road. Intended as a scenic park access experience, Picture Rocks Road was built with a low design speed to allow visitors to gradually experience dramatic views of the rocky Saguaro wilderness as they encounter changes in elevation and curvature.

With the growth of private development to the west and north of the park, Picture Rocks Road has evolved into a combined scenic and commuter route. Primary use of Picture Rocks Road is from non-visitor users, whose driving patterns are causing negative impacts on the park's resources and visitors. Slower-moving visitors have little time to safely pull over and savor scenic views and wildlife out of the flow of faster traffic, and there is very little roadside parking available, creating conflicts between user groups and potential safety hazards. The *Saguaro National Park Transportation and Visitor Use Study*. (David Evans and Associates 2006) states that "The level of traffic volumes and speeds observed along this roadway are incompatible with the typical park experience and safety of visitors."

Traffic, speeding, and accidents have all dramatically risen on Picture Rocks Road. Traffic data from the Federal Highway Administration shows steadily rising average daily trips (more than 6% per year over the last 15 years), which have more than doubled since 1988. Traffic speeds typically exceed the posted speed limit by 10 mph or more. Picture Rocks Road east of Golden Gate Road is nearing capacity (estimated capacity is 8-10,000 trips per day; in 2004 there were 7,440 trips per day), and operates at a level of service "E" (below acceptable operating conditions) during the peak hour (David Evans and Associates, 2006). Changes in elevation and curvature produce some areas where sight distance is limited. From 1998 to 2003, 121 accidents occurred along Picture Rocks Road, including one fatality and 79 accidents involving injuries, with the most accident-prone area being between Golden Gate Road and Box Canyon (David Evans and Associates, 2006). More than half of these accidents occurred within the park's boundaries, and 67% of the accidents involved speeding. As a result of these conditions, the park estimates that more than 50,000 animals die on roads in and around the park each year, visitor

experience is diminished, and roadside ecology is degrading.

The park expends considerable law enforcement resources patrolling Picture Rocks Road (enforcement typically involves speeding and DUI/DWI violations). To improve safety, visitor experience, resource management, and administrative operations, the park began working with David Evans and Associates, Inc. to create alternatives to calm traffic and increase safety. The park is also cooperating with Pima County and the state of Arizona to seek longer-term solutions for Picture Rocks Road. A draft "Memorandum of Understanding" between the park and Pima County would allow Pima County to assume all maintenance for Picture Rocks Road (currently the park maintains the road inside park boundaries). Pima County is also considering longer-term alternatives to alleviate traffic congestion on Picture Rocks Road and continue to provide access to the Tucson metropolitan area for area residents and visitors. One possibility is a new I-10 interchange at Twin Peaks Road, about 2 miles north of the Picture Rocks Road/ Sandario Road intersection.

Roadway Issues and Concerns

In addition to the situation on Picture Rocks Road, several other roadway-related issues exist. Maintenance, traffic speeds, and enforcement are also issues on Sandario Road. As with Picture Rocks Road, approximately 2 miles of Sandario Road — a local arterial — is within the park's boundary (the remainder of the road is owned and maintained by Pima County. Most accidents along Sandario Road in the park vicinity include speeding as a factor, and most occurred between Golden Gate and Kinney Road, or at the Kinney Road/Sandario Road intersection.

The current configuration of the Scenic Bajada Loop Drive requires visitors to travel onto Sandario Road briefly to complete the western portion of the loop. This configuration was developed due to sensitive terrain conditions. However, keeping visitors off the higher-speed Sandario Road during their drive has also become a high priority as traffic volumes and speeds on Sandario continue to rise. The park is exploring other possible configurations for the western edge of this loop that would sever the access between Sandario Road and the loop drive.

Issues related to the on-going difficulties of maintaining unpaved roads with fragile desert soils are discussed in the following "Park Operations and Facilities" section.

Parking

Tucson Mountain District has 141 formal parking spaces, located at the visitor center, picnic areas, and trailheads. Parking spaces are unpaved with the exception of the visitor center. All parking areas have excess capacity, with the exception of the Esperanza trailhead on weekends (David Evans and Associates, 2006). Tour buses park only at the visitor center. Availability of parking is not a major concern to the park, except as it affects safety and visitor experience on Picture Rocks Road and on-going maintenance for roadsides eroded by informal parking (maintenance of roadsides is substantial due to fragile desert soil conditions).

Trails

The park is preparing a comprehensive trail planning effort as this general management plan is being finalized. Six trail system objectives and four criteria were identified as part of the public scoping process for the general management plan. To improve trail management and reduce administrative operations impacts, park managers may convert some roads to trails, existing trails may be removed for rehabilitation, and others may be restricted and/or limited to certain

user groups (hiking, biking, and/or equestrian); also, some trails may be expanded. The trail plan is beyond the scope of this document.

The Tucson Mountain District has an extensive backcountry trail system used primarily by hikers with some equestrian use. Three trails cross Picture Rocks Road. The park is experiencing some boundary violations by all-terrain vehicles; however, these incursions are infrequent at this time. Golden Gate Road (used as a road and as a trail) connects to a regional trail system in Pima County, which passes into the Tucson Mountain County Park. The primary trails are Golden Gate Road/Trail, Picture Rocks Trail, and the Valley View Overlook Trail. Trails are restricted to daytime use because there is no camping in this district. Comments received during the scoping process revealed that there are congestion and user conflicts at the trailheads.

Transit

Sun Tran provides transit services for Tucson and close-in areas of Pima County. Sun Tran has very limited service west of I-10; the closest routes to the park are at the Pima Community College West Campus, and on Ina Road just east of the I-10 underpass. The Ina Road service ends more than 3 miles east of the park's eastern boundary, and the Community College is roughly 9 miles east of the park's southern border. Both services are more than 10 miles from the visitor center. Another possible provider in this area is Pima Rural Transit. Tour buses and school buses provide some limited services to the park. In a 2003/2004 visitor study done for the park (David Evans and Associates 2006), less than 14% of the visitors surveyed said they would take public transportation to this park district if transit service were available.

RINCON MOUNTAIN DISTRICT

The transportation system in this district of the park is quite different than the Tucson Mountain District, primarily because this district has no through roads and is therefore not appreciably impacted by non-visitor users.

Roadway Network

The Rincon Mountain District is about 5 miles from I-10. The closest major thoroughfares are Speedway Boulevard, Broadway Boulevard, and Old Spanish Trail, which is the major access to the visitor center. Of the five roads studied by David Evans and Associates' study in 2006, all were operating well under capacity; all levels of service were "A" with the exception of Old Spanish Trail north of the park entrance, which operates at levels of service "C" (acceptable operating conditions) (David Evans and Associates 2006).

There is only one road in this district, Cactus Forest Loop Drive, an 8-mile long paved scenic drive largely restricted to one-way, clockwise traffic. There is an entrance station east of the visitor center and slightly west of the Cactus Forest Loop Road. Occasionally, traffic queues back up past the visitor center. These traffic queues sometimes cause delays to cars wishing to park at the visitor center and impair pedestrian access.

Parking

The district has six developed parking areas, including the visitor center, picnic area and trailheads. The total parking capacity of the district is 105 spaces. Consistent with recreational travel patterns, parking demand is highest on the weekends, typically between 10 am and noon (David Evans and Associates, 2006).

Parking demand substantially exceeds supply in this park district, with the Speedway-

Douglas Spring Trailhead, Speedway Wildhorse Trailhead, Broadway Boulevard Trailhead, and the visitor center all beyond capacity on weekdays and weekends. Overflow parking frequently occurs along the roadsides, causing damage to roadside flora and fauna, additional maintenance and operations concerns for the park staff, and safety issues for visitors and motorists.

Trails

The park staff is preparing a comprehensive trail plan as this management plan is being finalized. Six trail system objectives and four criteria were identified as part of the public scoping process for this management plan. To improve trail management and reduce administrative operations impacts, park managers may convert some roads to trails, remove some existing trails for rehabilitation, or restrict and/or limit access to other trails to certain user groups (hiking, biking, and/or equestrian); also, some trails may be expanded. Trail planning is beyond the scope of this document.

With a minimal road network, the primary access to this park district is by unpaved trails, via horseback, bicycle, or on foot. Use of all-terrain vehicles on trails is minimal. The main trails are Douglas Spring, Wildhorse, Broadway, Desert Ecology, Loma Alta, and Freeman Homestead. Comments received during the scoping process revealed that there are congestion and user conflicts at the trailheads.

Transit

Sun Tran currently provides four bus routes within about 2 miles of the visitor center. Another possible provider in this area is Pima Rural Transit. Tour buses and school buses provide some very limited services to the district. In a 2003/2004 visitor study done for the park, less than 14% of the visitors surveyed said they would take public transportation to this park district if transit service were made available.

PARK OPERATIONS AND FACILITIES

PARK ORGANIZATION

Two districts, the Rincon Mountain District and the Tucson Mountain District — east and west of Tucson, Arizona respectively, make up Saguaro National Park. Both districts comprise 94,337 acres total within park boundaries.

The Park is administered by a superintendent and headquarters are located in the Rincon Mountain District.

Management of Saguaro National Park is organized into the following divisions: Ranger Services, Science and Resource Management, Administration, Facility Management, and Fire Management.

PARK OPERATIONS

Ranger Services Division

Visitor and Resource Protection Branch. The branch of Visitor and Resource Protection is responsible for law enforcement activities throughout the park. The law enforcement branch enforces laws and regulations intended to safeguard visitors and park resources. In addition to law enforcement, this division is responsible for search-and-rescue operations and emergency medical services park wide. Rangers make routine park visitor contacts to ensure that park regulations are understood and being met, to check for safety and resource violations, and to respond to or direct visitor inquiries to appropriate park staff. The law enforcement branch ensures that the park's designated wilderness areas are managed in compliance with the Wilderness Act.

Interpretive Branch. The Interpretive Branch is responsible for educating and instilling in visitors an understanding, appreciation, and enjoyment of the significance of this park and to ensure the protection and enjoyment of park resources. This includes educating visitors, stakeholders, and the general public about park resources, including the natural systems within the Sonoran desert ecosystem; cultural resources; wilderness and scenic values; scientific opportunities; and the role of this park in local, regional, and national contexts. NPS staff fulfills these responsibilities through formal education and orientation programs, interpretive programs, curriculum-based educational programs, and interpretive media. Personal services include staffing of the visitor center, ranger-led walks, talks and evening programs, demonstrations and special events and informal contacts with visitors. This branch is also responsible for supervision of publications and materials available at bookstores and sales outlets, exhibits and audiovisual media, website and electronic media.

Fee Management Branch. Fee Management is responsible for the collection, accounting, and deposit of entrance fees. They provide the first and sometimes the only ranger that visitors see when they enter the park. In addition to collecting fees, they provide important park orientation and safety information to the public.

Science and Resource Management Division

The Division of Science and Resource Management includes the management of all natural resources within the park to ensure the preservation of fundamental physical and biological processes, as well as individual species, features, and plant communities. This division also coordinates with the Western Archeological and Conservation Center and other NPS cultural resource specialists for management of park cultural resources and

the associated research, and stewardship of those resources. This division administers the park's Geographic Information System (GIS) database and all cooperative research and research permits within the park.

Administration Division

The Division of Administration is responsible for the park's budget and financial accounting, property management, payroll, personnel management, procurement, contracting, mail services, administrative filing, and management of the park wide computer system. This division is also responsible for employee housing management and the parkwide radio communications system.

Facility Management Division

The Division of Facility Management is responsible for the operation and maintenance of all park facilities and equipment, including buildings and maintained grounds; utility systems such as power, water, sewer, and solid waste management; employee housing; roads; parking areas and trailheads; trails; picnic areas; and telephones. This division is responsible for routine maintenance on the park vehicle fleet.

Fire Management Division

The Fire Management Division is responsible both for fire-fighting activities and for restoring the natural fire regime to backcountry and wilderness areas where fires naturally occur. The effects of fire on natural ecological systems are monitored through a fire ecology program. The division manages the park pack mule program.

STAFFING

Park staffing in 2005 was 63 employees. At current visitation levels it is expected that 76.5 employees would be sufficient to accommodate all operational needs. The minimum operating level is therefore defined as 76.5 employees. Current staffing is pressed to meet current demands — such as deferred maintenance needs, demands for increases in educational opportunities and outreach to school groups, better enforcement on park roads, fire management and trail maintenance needs, coordination of volunteers, managing resource impacts and impacts of exotic species, the need for general inventorying and monitoring of park resources, and providing staff resources to work with pressures on the park from surrounding development.

Volunteers in Parks (VIP)

The park relies heavily on volunteers to complete a variety of tasks including trails maintenance, restoration and patrols, natural resource management for exotic plants, animal surveys and monitoring, monitoring archeological sites, staffing the visitor centers, and leading interpretive programs. The park has benefited from volunteer service hours. In FY 2002, 52,665 hours were contributed to the park as part of the VIP program. In FY 2003 35,509 hours (446 volunteers) were donated; in FY 2004 and 2005, 36,800 (520 volunteers) and 29,308 (550 volunteers) hours were donated, respectively.

Current Partnerships/Associations

The park will continue to build relationships with new partners including, universities, colleges, schools, institutes and organizations as well as local, state and federal agencies to accomplish a variety of operational based programs.

PARK FACILITIES

Park facilities are primarily designed to provide safe, enjoyable and educational access and support to visitors who come to experience the park as well as administrative space for park staff. Park facilities are typically located in areas that can sustain visitation while protecting park resources and natural systems.

Public Facilities

Trails and Trailheads. There are 72 officially designated and maintained trails within the park totaling more than 185 miles. The park trails crew, with assistance from a team of volunteers, patrols, maintains, and repairs all park trails. Trail use is divided primarily between hikers, runners, and horseback riders, with limited use by bicyclists. Currently, 14% of park trails are classified in good condition, 11% are in fair condition, 53% are in poor condition, and 22% are in very poor (serious) condition. The park has begun a comprehensive trails plan that reflects existing and future use and associated impacts as well as addressing site-specific issues related to trails and trail management.

Park Roads. In the Rincon Mountain District is the 8-mile-long, one-way, paved loop road (including a two-way section between the visitor center and the Javelina picnic area) known as the Cactus Forest Scenic Drive. In the Tucson Mountain District are five access roads including, Kinney Road, Sandario Road, Hohokam Road, Golden Gate Road, and Picture Rocks Road. Kinney Road provides the main, paved access route into the Tucson Mountain District of Saguaro National Park from the popular adjacent Tucson Mountain County Park, Old Tucson Studios, and the Arizona-Sonora Desert Museum. Hohokam Road is a 6-mile-long graded dirt road that creates the Bajada Loop Drive. The Golden Gate Road is a (3.8 mile) graded dirt road that connects a portion of the Bajada Loop Drive with Picture Rocks Road. Two and a half miles of Sandario Road is within the park boundary and is the main paved north-south route on the western edge of the Tucson Mountain District. Picture Rocks Road is a paved road that crosses the northern portion of the Tucson Mountain District and connects Avra Valley to the city of Tucson. Both Sandario Road and Picture Rocks Road are currently used almost solely by commuters or as nonrecreational travel corridors.

These uses are not fundamental to the purpose of this park, and there are not efficient safeguards to maintain and regulate safe conditions for park visitors and park resources. As a result, excessive high speeds and nonrecreational traffic create an unsafe environment and create regular conflicts between commuters and park visitors. The current condition of these roads requires considerable staff time related to law enforcement, emergency response, and resource protection. These activities pull staff from other areas of the park thereby depriving park users engaged in activities core to the park's purpose from benefiting from the services of these personnel.

The unpaved Golden Gate Road is in poor condition and consumes park staff time and resources to maintain this infrequently used road.

For issues related to condition, design, and road hazards please refer to the transportation section.

Entrance Stations. The park has one staffed fee entrance station in the Rincon Mountain District for the scenic Cactus Forest Loop Drive. Visitors to the Tucson Mountain District are asked to pay at the Red Hills Visitor Center on a voluntary basis. One area that lacks an appropriate visitor contact entrance station is along the Picture Rocks Road in the Tucson Mountain District. Without dedicated entrance stations, the park

cannot guarantee all park visitors have paid user fees.

Parking Areas. There are 20 official parking areas in the park, 9 in the Tucson Mountain District and 11 in the Rincon Mountain District. Maintained parking areas include trailhead parking, picnic area parking, visitor center parking, and park administration and maintenance area parking. Current parking at the Rincon Mountain visitor center has several problems. The design and layout of the parking lot and entrance station creates unnecessary congestion within the parking lot contributing to user conflicts between visitors in queue to enter the Cactus Forest Loop Drive and visitors parking to enter the visitor center. Based on visitation, there is inadequate parking to accommodate use levels. Additionally, many visitors to the Rincon Mountain District use the visitor center parking lot as a trailhead for regional trail use.

Most park trailheads are too small to accommodate existing use or are informal resulting in unregulated parking on road shoulders or on top of park resources. Parking issues and conflicts continue to consume park staff resources and time.

Visitor Centers. Two visitor centers in the park provide services year-round. Both the Red Hills Visitor Center in the Tucson Mountain District, constructed in 1994, and the Rincon Mountain District visitor center, constructed in the early 1950s, are staffed by park rangers and offer exhibits, audiovisual programs, as well as books, maps, and guides for sale. Aside from routine maintenance, the Red Hills Visitor Center is in excellent condition and serves its purpose well. The Rincon Mountain District visitor center is outdated and does not have adequate space for necessary visitor service functions or staff offices.

Orientation, Wayside Exhibits, and Interior Exhibits. Interior exhibits in the Rincon Mountain visitor center are outdated and require substantial upgrades to reflect current science and accessibility requirements. Several locations throughout the park lack adequate wayside exhibits and signs for park visitors.

Camping. Designated camping exists above 4,500 feet in the backcountry of the Rincon Mountain Wilderness area. No developed camping exists within the park. There are 21 backcountry campsites in six designated camping areas in the Rincon Mountain District.

Administrative Facilities

Offices, Storage, and Park Buildings. Space allocation for park offices has increased over time, but remains inadequate to meet current needs. Office space is insufficient. Storage facilities are not adequate to meet park needs. With the exception of the main fire facility, located on adjacent Bureau of Land Management property, all park offices, storage and general use buildings are located within park boundaries. Many of the functions housed by these facilities are not necessary to be located within the park boundaries and could be located outside park boundaries.

Corrals. The corral at Madrona has been condemned and is currently closed due to health hazards created by a rodent infestation, problems associated with lead-based paint, and proximity to water resources. Because pack operations that serve the Rincon Mountain District must operate from a remote location, considerable time and effort is added to the packer's schedule for servicing this district in addition to strain on pack stock as a result of moving animals by trailer. The primary corral in the Rincon Mountain District is in the headquarters area and includes numerous buildings, shade structures, paddocks, and fenced enclosures. A basic corral exists at Manning Camp and includes a shed, paddock, and fenced enclosures.

The corral in the Tucson Mountain District, which contains a small building and a fenced enclosure, is in relatively poor condition and is used infrequently.

Park Housing. There are three houses in the Rincon Mountain District (two in the headquarters area and one at Madrona) and three houses (one stand-alone house and one duplex) in the Tucson Mountain District for park employees. The house at Madrona has been condemned due to construction methods and biohazards associated with rodents that carry the hanta virus, lead-based pint, and insect infestations. The two houses in the headquarters area are listed in good condition. The three units in the Tucson Mountain District are adjacent to the Red Hills Visitor Center and are in good condition.

Other Buildings. The use of Manning Camp for fire management activities creates considerable impacts on park operations due to the logistics required to support such activities in a remote wilderness area. This camp serves as a permanent base camp for four months every season. Support services include a bi-weekly mule train from lower elevations to the top of Mica Mountain to transport supplies, two helicopter supply drops per year and the routine maintenance and upkeep of developed uses. Developed infrastructure at Manning Camp that requires regular maintenance includes: seven weather ports, a water system with associated plumbing, a vault toilet, barn/storage building, propane tanks, refrigerator, stove, lighting system, solar panels and general building upkeep.

The vacant Civilian Aeronautical Administration (CAA) building at Madrona is eligible for listing on the National Register of Historic Places yet serves no park purpose or useful function. This building is also infested with rodents that may carry the hanta virus and pose a health risk to humans.







4

Environmental Consequences

INTRODUCTION

The National Environmental Policy Act requires that environmental documents discuss the environmental impacts of a proposed federal action, feasible alternatives to that action, and any adverse environmental effects that cannot be avoided if a proposed action is implemented. In this case the proposed federal action would be the adoption of a general management plan for Saguaro National Park. The following portion of this document analyzes the environmental impacts of implementing each of the three alternatives on natural resources, cultural resources, the visitor experience, the socioeconomic environment, and park operations. The analysis is the basis for comparing the beneficial and adverse effects of implementing the alternatives. By examining the environmental consequences of all alternatives on an equivalent basis, decision makers can evaluate which approach would create the most desirable combination of the greatest beneficial results with the fewest adverse effects on the park.

Because of the general, conceptual nature of the actions described in the alternatives, the impacts of these actions are analyzed in general qualitative terms. Thus, this environmental impact statement should be considered a programmatic analysis. If and when site-specific developments or other actions are proposed for implementation subsequent to this *General Management Plan*, appropriate detailed environmental and cultural compliance documentation will be prepared in accord with the National Environmental Policy Act and National Historic Preservation Act requirements.

The existing conditions for all the impact topics that are analyzed here were identified in the "Affected Environment" chapter. All the impact topics are assessed for each alternative. Impact analysis discussions are organized by alternative and then by impact topic under each alternative. For each impact topic, there is an analysis of the beneficial and adverse effects of implementing the alternative, a description of cumulative impacts (when this project is considered in conjunction with other actions occurring in the region), and a conclusion. At the end of each alternative there is also a brief discussion of unavoidable adverse impacts, irreversible and irretrievable commitments of resources, and the relationship of short-term uses of the environment and the maintenance and enhancement of long-term productivity. The impacts of each alternative are briefly summarized in table 10, at the end of the "Alternatives, Including the Preferred Alternative" chapter.

CUMULATIVE IMPACT ANALYSIS

A cumulative impact is described in the Council on Environmental Quality's regulation 1508.7 as follows:

> *Cumulative impacts* are incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or nonfederal) or person undertakes such other action. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

To determine potential cumulative impacts, *other* projects within and surrounding Saguaro National Park were identified. The area included Pima County and the city of Tucson. Projects were identified by discussions with the park staff, federal land managers, and representatives of county and city governments. Potential projects identified as cumulative actions included any planning or development activity that was currently being

implemented, or that would be implemented in the reasonably foreseeable future. Impacts of past actions were also considered in the analysis.

These actions are evaluated in conjunction with the impacts of each alternative to determine if they have any cumulative effects on a particular natural, cultural, or socioeconomic resource or visitor use. Because most of these cumulative actions are in the early planning stages, the qualitative evaluation of cumulative impacts was based on a general description of the project.

Actions and Projects inside Saguaro National Park

The primary completed and ongoing projects and actions that could contribute to cumulative effects are described briefly below.

- rehabilitate Cactus Forest Drive
  This action on the 8.4-mile drive along route 500 and route 100 improved deteriorating road edges and lateral cracking in the roadbed, primarily resulting from drainage control problems.
- exotic plant management plan
  Exotic plants infest about 2.6 million acres in the national park system, reducing natural diversity. At Saguaro National Park, with 80 exotic plant species in the park, this plan describes the proposal to use a proactive, integrated approach to managing exotic plant infestations.
- comprehensive trails plan
  Saguaro National Park has begun a comprehensive trails plan, which is being conducted in close coordination with this general management plan. More information on this plan can be found in the "Other Planning Efforts Related to This General Management Plan" section of this document.
- fire management plan
  This plan is being undertaken because Congress has directed all agencies to take a strong look at vegetation and fuel accumulation in relation to safety for firefighters, the public, and surrounding communities. Another plan goal is to reduce the threat to real property from wildland fire concurrent with the park's mission. The problems of fire hazard reduction, while still protecting, restoring, and maintaining the historic and natural systems, are complex.

Actions and Projects outside Saguaro National Park

Cienega Corridor. An area also known as the "missing link" lands, the Cienega Corridor Conservation Council and stakeholders involved in the creation of the Las Cienegas National Conservation Area have proposed expanding the conservation efforts north to encompass the land between the conservation area and Saguaro National Park. The goal would be to keep open an important wildlife movement corridor connecting the "sky islands," which is especially important to mountain mammals such as black bears, mountain lions, coatimundis, and mule deer. The corridor is in a major watershed formed by the Rincon, Whetstone, Santa Rita, and Empire Mountain ranges. The watershed also provides Tucson up to 20% of its groundwater recharge system.

Houghton Area Master Plan. The plan encompasses approximately 10,800 acres southwest of Saguaro National Park's Rincon Mountain District along Houghton Road. Seventy-six percent of the land covered by the plan managed by the Arizona State Land Department and is undeveloped. The master plan establishes the policy and procedural frameworks necessary to guide growth and development within the area. The plan shows a mix of current and proposed high- and low-density residential development. About 15%

of the area is already high- to medium-density residential development. Most of the undeveloped area is proposed to be either low or very low density residential development.

Ironwood Forest National Monument Resource Management Plan. The plan will guide management of public lands within the Ironwood Forest National Monument. The planning area covers approximately 129,068 acres of federal land, 6,012 acres of private land, and 54,697 acres of Arizona State Trust land.

Las Cienegas National Conservation Area Resource Management Plan. This is a plan for managing 49,000 acres of public land, resources, and uses within the Las Cienegas National Conservation Area and the Sonoita Valley Acquisition Planning District.

Pima Association of Governments (PAG) 2030 Transportation Plan. This plan outlines the transportation projects and goals for the county, including the Twin Peaks Interchange and paving the scenic Bajada Loop Drive and Golden Gate Road.

Pima County Comprehensive Plan (2001). This plan updates the 1992 *Pima County Comprehensive Plan* to reflect the land use concepts, policies, and principles of conservation identified in the draft Preliminary Sonoran Desert Conservation Plan.

Rincon/Southeast Subregional Plan. This plan establishes future land use and development policies for the area on the south side of Saguaro National Park's Rincon Mountain District, which have the potential for future annexation to Tucson. This plan covers about 400 square miles, which is mostly rural and sparsely populated. This demographic is rapidly changing. The plan goes into effect when an area is annexed by the city of Tucson. This subregion is broken into 15 areas. Most of the areas are zoned residential, ranging from low intensity rural (less than 0.3 residences/acre) to medium intensity urban (5 residences/acre). The remaining areas are either industrial or a resource transition area.

Sonoran Desert Conservation Plan. This regional plan was developed to address the long-term conservation needs of the full range of natural and cultural resources. It is a plan that can serve as the cornerstone of conservation as well as economic expansion.

Tucson Mountains Subregional Plan. This plan establishes future land use and development policies for the area on the east, south, and west sides of Saguaro National Park's Tucson Mountain District, which have the potential for future annexation to Tucson. This plan covers about 280 square miles. The current demographic ranges from medium density urban residential to rural. The plan goes into effect when one of the six areas within the plan is annexed by Tucson. Most of the area is designed as residential ranging in density from medium high intensity urban (24 residences/acre) to low intensity urban (0.5 residences/acre). The remaining area is zoned as industrial.

IMPAIRMENT OF NATIONAL PARK RESOURCES

In addition to determining the environmental consequences of implementing the preferred and other alternatives, NPS *Management Policies* (section 1.4) requires analysis of potential effects to determine whether or not proposed actions would impair park resources and values.

The fundamental purpose of the national park system, established by the Organic Act and reaffirmed by the General Authorities Act, as amended, begins with a mandate to conserve park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the National Park

Service the management discretion to allow impacts on park resources and values when necessary and appropriate to fulfill the purposes of the park, as long as the impact does not constitute impairment of the affected resources and values. Although Congress has given the National Park Service the management discretion to allow certain impacts within a national park, that discretion is limited by the statutory requirement that the National Park Service must leave resources and values unimpaired unless a particular law directly and specifically provides otherwise.

The prohibited impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of park resources and values, including the opportunities that otherwise would be present for the enjoyment of those resources or values (NPS *Management Policies 2006* 1.4.5). An impact on any park resource or value may, but does not necessarily, constitute an impairment. An impact would be more likely to constitute impairment to the extent that it affects a resource or value whose conservation is

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park, or
- key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park, or
- identified in the park's general management plan or other relevant NPS planning documents as being of significance.

Impairment may result from visitor activities; NPS administrative activities; or activities undertaken by concessioners, contractors, and others operating in the park. A determination on impairment is made in the "Environmental Consequences" section in the conclusion section for each required impact topic related to the park's resources and values.

An evaluation of impairment is not required for some impact topics including visitor experience (unless the impact is resource based), transportation, NPS operations, or the socioeconomic environment. When it is determined that an action(s) would have a moderate to major adverse effect, a justification for nonimpairment is made. Impacts of only negligible or minor adverse intensity would by definition not result in impairment.

METHODS AND ASSUMPTIONS FOR ANALYZING IMPACTS

The planning team based the impact analysis and the conclusions in this chapter largely on the review of existing literature and studies, information provided by experts in the National Park Service and other agencies and park staff insights and professional judgment. The team's method of analyzing impacts is further explained below. It is important to remember that all the impacts have been assessed assuming mitigative measures have been implemented to minimize or avoid impacts. If mitigative measures described in the "Alternatives Including the Preferred Alternative" chapter were not applied, the potential for resource impacts and the magnitude of those impacts would increase.

Director's Order 12, "Conservation Planning, Environmental Impact Analysis, and Decision Making," presents an approach to identifying the duration (short or long term), type (adverse or beneficial), context (the setting within which an effect would occur) and intensity or magnitude (e.g., negligible, minor, moderate, or major) of the impact(s), and that approach has been used in this document.

Direct and indirect effects caused by an action were considered in the analysis. Direct effects are caused by an action and occur at the same time and place as the action. Indirect effects are caused by the action and occur later in time or farther removed from the place, but are still reasonably foreseeable.

The impact analyses for the no-action alternative compare resource conditions in the year 2021 to existing conditions in 2006 assuming continuation of current management direction. The impact analysis for the action alternatives (the preferred alternative 2 and alternative 3) compares the action alternatives in the year 2021 to the no-action alternative in the year 2021. Said differently, the impacts of the action alternatives describe the *difference between* implementing the no-action alternative and implementing the action alternatives. To understand a complete "picture" of the impacts of implementing any of the action alternatives, the reader must also take into consideration the impacts that would occur under the no-action alternative.

NATURAL RESOURCES

The natural resource impact topics analyzed in this document are soundscapes, soils, vegetation, wildlife, and special status species (which include both federally listed species and those listed by the state as threatened and endangered). Information about known resources was compiled and compared with the locations of proposed developments and other actions. The impact analysis was based on the knowledge and best professional judgment of planners, and biologists; data from park records; and studies of similar actions and effects, when applicable. The planning team qualitatively evaluated the intensities of effects on all the natural resource impact topics. Unless otherwise specified, the following terms are used to describe the duration of the impacts:

Short term: The effect would be temporary, lasting a year or less, such as effects associated with construction.

Long term: The effect would last more than one year and could be permanent; for example, the loss of soil due to the construction of a new facility.

The intensity of effects on ***vegetation*** and ***wildlife*** was evaluated as follows:

Negligible: The action might result in a change in vegetation or wildlife, but the change would not be measurable or would be at the lowest level of detection.

Minor: The action might result in a detectable change, but the change would be slight and have a local effect on a population. This could include changes in the abundance or distribution of individuals in a local area, but not changes that would affect the viability of local populations. Changes to local ecological processes would be minimal.

Moderate: The action would result in a clearly detectable change in a population and could have an appreciable effect. This could include changes in the abundance or distribution of local populations, but not changes that would affect the viability of regional populations. Changes to local ecological processes would be of limited extent.

Major: The action would be severely adverse or exceptionally beneficial to a population. The effects would be substantial and highly noticeable, and they could result in widespread change and be permanent. This could include changes in the abundance or distribution of a local or regional population to the extent that the population would not be likely to recover (adverse) or would return to a sustainable level (beneficial). Important ecological processes would be altered, and "landscape-level" (regional) changes would be expected.

For ***threatened and endangered species and species of concern***, the following impact intensities apply. These definitions are consistent with the language used to determine effects on threatened and endangered species under the federal Endangered Species Act:

No effect: The action would cause no effect on the species or critical habitat if present.

Not likely to adversely affect: The action would be expected to result in discountable effects on a species or critical habitat (that is, extremely unlikely to occur and not able to be meaningfully measured, detected, or evaluated), or it would be completely beneficial.

Likely to adversely affect: The action would result in a direct or indirect adverse effect on a species or critical habitat, and the effect would not be discountable or completely beneficial.

The intensity of effects on ***soils/geologic resources*** was evaluated as follows:

Negligible: The action would result in a change in soils or a geologic feature, but the change would be at the lowest level of detection, or not measurable.

Minor: The action would result in a detectable change, but the change would be slight and local. Soils or geologic resources might be slightly altered in a way that would be noticeable. There could be changes in a soil's profile in a relatively small area, but the change would not appreciably increase the potential for erosion.

Moderate: The action would result in a clearly detectable change in soils or geologic resources — soils would be obviously altered, or a few features would show changes. There could be a loss or alteration of the topsoil in a small area, or the potential for erosion to remove small quantities of additional soil would increase.

Major: The action would result in the permanent loss of an important soil or geologic resource, or there would be highly noticeable, widespread changes in many soils or features. There would be a permanent loss or alteration of soils or geologic resources in a relatively large area, or there would be a strong likelihood for erosion to remove large quantities of additional soil as a result of the action.

The intensity of effects on ***soundscapes*** was evaluated as follows:

Negligible: The natural sound environment might be affected, but the effects would be at or below the level of detection, or

changes would be so slight they would not be of any measurable or perceptible consequence to wildlife or the visitor experience.

Minor: There would be a detectable change in the natural sound environment, but the effects would be small, local, and of little consequence to wildlife or the visitor experience.

Moderate: A change in the natural sound environment would be readily detectable, affecting the behavior of wildlife or visitors in a large area.

Major: A severely adverse or exceptionally beneficial change in the natural sound environment would be obvious and would affect the health of wildlife or visitors or cause a substantial, highly noticeable change in the behavior of wildlife or visitors in a local or regional area.

CULTURAL RESOURCES

Cultural Resources Listed, or Eligible to Be Listed, in the National Register of Historic Places

Potential impacts on cultural resources (archeological resources, prehistoric or historic structures, cultural landscapes, and traditional cultural properties) either listed in or eligible to be listed in the National Register of Historic Places were identified and evaluated in accordance with the Advisory Council on Historic Preservation's regulations implementing Section106 of the National Historic Preservation Act (36 CFR 800, Protection of Historic Properties) by

(1) determining the area of potential effects;
(2) identifying national-register-listed or eligible cultural resources in the area of potential effects
(3) applying the criteria of adverse effect to affected resources; and
(4) considering ways to avoid, minimize, or mitigate adverse effects.

Under the Advisory Council's regulations a determination of adverse effect or no adverse effect must be made for affected national-register-listed or eligible cultural resources. An adverse effect occurs whenever an action alters directly or indirectly any of the characteristics of a cultural resource that qualify it for inclusion in the national register, i.e., diminishing the integrity (the extent to which a resource retains its historic appearance) of the resource's location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects caused by the alternatives that would occur later in time, be farther removed in distance, or be cumulative (36 CFR 800.5(a)(1)). A determination of no adverse effect means there is an effect, but the effect would not meet the criteria of adverse effect (36 CFR 800.5(b)).

In this general management plan the criteria for characterizing the severity or intensity of impacts on national-register-listed or eligible archeological resources, prehistoric or historic structures, and cultural landscapes (there are no cultural resources designated traditional cultural properties in Saguaro National Park, but there is one potential area) are the Section106 determinations of effect: adverse effect or no adverse effect.

Ethnographic Resources

Ethnographic resources that are not traditional cultural properties, which are generally ineligible for listing in the national register, are not subject to Section106 of the National Historic Preservation Act. In this general management plan potential impacts on ethnographic resources are described in terms of context (are the effects site-specific, local, or even regional?), duration (are the effects short-term — lasting less than a year, long-term — lasting more than a year, or permanent?) and intensity (is the degree or severity of effects negligible, minor, moderate,

or major). The definitions of impact intensity for ethnographic resources follow:

Ethnographic Resources

Negligible: Impact(s) would be barely perceptible and would neither alter resource conditions, such as traditional access or site preservation, nor the relationship between the resource and the affiliated group's body of practices and beliefs.

Minor: Adverse impact — impact(s) would be slight but noticeable but would neither appreciably alter resource conditions, such as traditional access or site preservation, nor the relationship between the resource and the affiliated group's body of practices and beliefs.
Beneficial impact — would allow access to and/or accommodate a group's traditional practices or beliefs.

Moderate: Adverse impact — impact(s) would be apparent and would alter resource conditions. Something would interfere with traditional access, site preservation, or the relationship between the resource and the affiliated group's practices and beliefs, even though the group's practices and beliefs would survive.
Beneficial impact — would facilitate traditional access and/or accommodate a group's practices or beliefs.

Major: Adverse impact — impact(s) would alter resource conditions. Something would block or greatly affect traditional access, site preservation, or the relationship between the resource and the affiliated group's body of practices and beliefs, to the extent that the survival of a group's practices and/or beliefs would be jeopardized.
Beneficial impact — would encourage traditional access and/or accommodate a group's practices or beliefs.

VISITOR USE AND EXPERIENCE

This impact analysis considers various aspects of visitor use and experience at Saguaro National Park, including the effects on: the range of recreational opportunities; opportunities for solitude and getting in touch with nature; visitor access including access for visitors with disabilities; opportunities for orientation, education, and interpretation; and visitor safety. The analysis is primarily qualitative rather than quantitative due to the conceptual nature of the alternatives.

Impacts on visitor use and experience were determined considering the best available information regarding visitor use and experience. Information on visitor use and visitor opinions was taken from a survey of visitors conducted by the University of Arizona from November 2003 to March 2004 and compiled by David Evans and Associates (2006). This information was supplemented by data gathered during the planning process for this management plan, including opinions from national park visitors and neighbors and information provided by national park staff.

Primarily, visitors expressed interest in preserving the natural and cultural resources of the park, continuing to provide high-quality trail opportunities, protecting opportunities for solitude and natural quiet, educating visitors and neighbors about the park's unique resources and values, and exploring new opportunities for links to regional trails.

For analysis purposes, impact duration, intensities, and types for visitor experience impact topics have been defined as follows:

Duration of Impact. A short-term impact would last less than one year and would affect only one season's use by visitors. A long-term impact would last more than one year and would be more permanent in nature.

Intensity of Impact. Impacts were evaluated comparatively between alternatives, using the

no-action alternative as a baseline for comparison with each action alternative:

Negligible — Visitors would likely be unaware of any effects associated with implementation of the alternative.
Minor — Changes in visitor use and/or experience would be slight but detectable, would affect few visitors, and would not appreciably limit or enhance experiences identified as fundamental to the park's purpose and significance.
Moderate — Some characteristics of visitor use and/or experience would change, and many visitors would likely be aware of the effects associated with implementation of the alternative; some changes to experiences identified as fundamental to the park's purpose and significance would be apparent.
Major — Multiple characteristics of visitor experience would change, including experiences identified as fundamental to park purpose and significance; most visitors would be aware of the effects associated with implementation of the alternative.

Type of Impact. Adverse impacts are those that most visitors would perceive as undesirable. Beneficial impacts are those that most visitors would perceive as desirable.

SOCIOECONOMIC ENVIRONMENT

Saguaro National Park primarily operates within the local social and economic environment of the surrounding communities and regionally within Pima County. As such, actions proposed in the alternatives could have a direct effect on some parts of the social and economic environment of the region. In the socioeconomic analysis, the duration of effects is considered to be either short term (lasting less than one year), or long term (lasting more than one year). Long-term effects could be considered as a permanent change in conditions.

The Money Generation Model (MGM2) was developed by the National Park Service in 1990 and updated in 2000 to help national parks estimate local economic impacts of visitor spending. The MGM2 estimates what park visitors spend in the local area and the impacts of this spending in terms of sales, income, jobs, and local tax receipts. Value added is the sum of employee compensation, income of sole proprietors, and indirect business taxes. As the name implies, it is the value added by the region to the final good or service being produced. It can also be defined as the final price of the good or service minus the costs of all of the non-labor inputs to production. Direct effects are measured in terms of change in sales, income, and jobs in those businesses or agencies that directly receive the visitor spending. Direct effects accrue largely to tourism-related businesses in the area. Secondary effects are measured to include both indirect and induced effects that result from the circulation of the initial spending through the local economy and are captured by multipliers. Indirect effects accrue to a broader set of economic sectors that serve tourism firms. Induced effects are the impacts of household expenditures, from the income earned in a directly or indirectly affected industry. Total effects are the sum of direct, indirect, and indirect effects (NPS 1995; Stynes et al. 2000; Stynes and Sun 2003, NPS 2006c).

The intensity of effects on socioeconomics was evaluated as follows:

Negligible — No effects occur or the effects on socioeconomic conditions are below or equivalent to the level of detection.
Minor — The effects on socioeconomic conditions are slight but detectable, and only affect a small number of park services and/or a small portion of the surrounding population. The impact is considered slight and not detectable outside the affected area.
Moderate — The effects on socioeconomic conditions are readily apparent. Any

effects would result in changes to socioeconomic conditions on a local scale in the affected area.

Major — The effects on socioeconomic conditions are readily apparent. Measurable changes in social or economic conditions at the county level occur. The impact is severely adverse or exceptionally beneficial within the affected area.

TRANSPORTATION

Methodology and Assumptions

Transportation and land use planning in the areas surrounding the park have direct and indirect influences on transportation to, from, and within the park. Pima County land use and transportation plans, the Saguaro National Park Transportation and Visitor Use Study (David Evans and Associates 2006), information from park and other NPS staff, on-site observations, and professional judgment were all used to analyze transportation effects and impacts. Certain assumptions were used to develop the transportation impacts:

- Growth in Pima County from 2005–2025 will increase about 30%. Growth in Western Pima County will continue to be rural (low to very low density) with very limited commercial and public services. Tucson will continue to provide most goods, services, and economic opportunities for this area.
- Recreational opportunities are dispersed throughout the region; the park is not the sole destination for residents. Visitation will remain fairly constant, with increases commensurate with regional growth and demand for recreation.
- No new major east-west roadways will link Western Pima County with Tucson other than those shown in the *2030 Regional Transportation Plan*. No additional roads will be constructed in the park, loop roads will not become through roads.
- A traffic impact study, model and/or similar methodology and NEPA compliance will be completed before permanent installation of traffic-calming measures on Picture Rocks Road.
- Public transit service within one-quarter mile of any of the park's primary facilities will not be available in the foreseeable future. Some park neighbors will continue to access the park on foot, bicycle, and/or horseback instead of in an automobile.
- Picture Rocks Road remains open to traffic.
- Trails and trail issues such as connectivity, crossings, conflicts with other users, and locations and parking for new trails will be addressed in the forthcoming comprehensive trails plan.
- Transportation conditions at the Tucson Mountain District and Rincon Mountain District must be evaluated separately, due to the distance between the districts and their differing contexts for transportation. All park users in the Rincon Mountain District are assumed to be visitors; park users in the Tucson Mountain District are divided into two groups: non-visitor (generally commuters or pass-through traffic) and visitor users, due to their differing patterns of use.

Impact Thresholds

Impacts on visitors and non-visitor users were evaluated in four areas:

- Circulation addresses potential impacts to the roadway network of the park and the nearby Tucson metropolitan area. It includes issues such as potential diversion of traffic, access, travel time, vehicle miles traveled, and capacity.
- Safety refers to accident rates, frequent traffic violations (such as speeding), emergency response, and visitor/non-visitor conflicts.

- Parking addresses changes in parking supply and/or location.

Transportation impacts were evaluated on a qualitative basis. The following thresholds were used to define the intensity of transportation impacts:

No effect — the impact would cause no effect on visitor or non-visitor users.
Negligible — the impact would be undetectable or barely detectable and/or would affect very few visitors or users. Visitors and/or users on-site and off-site would not likely be aware of the effects of transportation management actions.
Minor — the impact would be detectable and/or would only affect a limited number of visitors or users. Visitors and/or users on-site and off-site would be aware of the effects of transportation management actions, but their satisfaction or dissatisfaction would not be measurably affected.
Moderate — the impact would be apparent and/or would affect many visitors or users. Visitors and/or users on-site and off-site would be aware of the effects associated with transportation management actions, and their satisfaction or dissatisfaction would be measurably affected.
Major — the impact would be readily apparent and/or would affect the majority of visitors or users. Visitors or users on-site and off-site would be strongly aware of the effects associated with transportation management actions, and their satisfaction or dissatisfaction would be measurably affected to a high degree.

Duration

The duration of an impact considers whether transportation management actions would last less than one year and and/or would be temporary in nature, or if the impact would be long-term (more than one year) and/or permanent in nature. A *short-term* impact is one that would be created during installation, construction, and/or testing of traffic-calming devices and/or parking, and would generally last one year or less. A *long-term* impact would be created through the ongoing operation and use of traffic-calming devices and increased parking supply.

Type of Impact

Impacts are evaluated in terms of whether the impacts on park and regional transportation resulting from management actions would be beneficial or adverse. *Beneficial* impacts would improve circulation, safety, capacity, and/or parking for visitors and/or non-visitor users. *Adverse* impacts would negatively affect visitors and/or non-visitor users and make circulation more difficult, decrease safety, decrease capacity and/or restrict parking for visitors and non-visitor users.

PARK OPERATIONS

Basis of Analysis

The impacts of the alternatives on park operations and facilities were determined by examining the effects and changes on staffing, infrastructure, visitor facilities, and services.

Intensity

The intensity of the impact considers whether the impact would be negligible, minor, moderate or major.

Negligible— Impacts would have no discernible effect on park operations and facilities.
Minor — Impacts on park operations and facilities would be slightly detectable but would not be expected to have an overall effect on the ability of the park staff to provide services and facilities to the visiting public.

Moderate — Impacts would be clearly detectable and could have a noticeable effect on park operations and facilities.

Major — Impacts would have a substantial influence on park operations and facilities and include impacts that would change the park's ability to provide adequate services and facilities to visitors and staff.

Duration

The duration of the impact considers whether the impact would occur for a short term and be **temporary** in nature, and associated with transitional types of activities, or if the impact would occur over a long period of time and have a **permanent** effect on park operations and facilities.

Type of Impact

Impacts are evaluated in terms of whether the impacts on park operations and facilities would be **beneficial** or **adverse**. Beneficial impacts would improve park operations and/or facilities. Adverse impacts would negatively affect park operations and/or facilities and could hinder the park staff's ability to provide adequate services and facilities to the visiting public.

IMPACTS OF IMPLEMENTING THE NO-ACTION ALTERNATIVE

NATURAL RESOURCES

Vegetation

Analysis. Trampling would continue to affect vegetation along social trails and in and near campgrounds, campsites, picnic areas, trailheads, administrative buildings, and scenic and interpretive facilities, with the effects ranging from complete absence of vegetation to slight alterations in species composition. Similar effects would be evident along road shoulders, where cars crush vegetation and compact soil in informal pull-offs along Picture Rocks Road and other park roads. The long-term adverse effects of vegetation loss in localized areas would be minor.

In addition, the unintentional transport of exotic plants into and around the park by visitors and wind would continue (as discussed on p. 37), although the magnitude of this effect is unknown. The park would continue to address this issue as directed in their exotic plant management plan, which would reduce the effects on the park's native vegetation.

Cumulative Effects. The recent rehabilitation of Cactus Forest Loop Drive had negligible short-term impacts and long-term beneficial impacts on vegetation.

Outside the park, development in the Houghton area, Rincon/Southeast Subregional area, and Tucson Mountain Subregional area surrounding the park would continue to alter the types and distribution of vegetation. The areas have been zoned to protect habitat while allowing for growth and the expansion of the Tucson area. The impacts from development would be long-term, adverse, and moderate.

The Cienega Conservation Corridor is being managed by a partnership composed of private, nonprofit, and governmental partners. Potentially connecting to the Las Cienegas National Conservation Area would allow this riparian corridor to continue with traditional recreational and ranching uses, which would have a long-term beneficial effect on vegetation. The Cienega Corridor would protect an area south of the Rincon Mountain District and Coronado National Forest to the Las Cienegas National Conservation Area. This action would have a long-term moderate beneficial impact on vegetation in the region.

The creation of the Ironwood Forest National Monument west of Tucson increased the level of protection on approximately 190,000 acres of land, of which almost 130,000 acres is federal property. This action, added to the effects of increasing educational and interpretive efforts in the national monument, has resulted in better protection of native vegetation. This action would continue to have a long-term moderate beneficial impact on vegetation in the region.

Overall, when all the effects of actions in and outside the park were added to the effects from alternative 1 (primarily continuing effects from visitor use), the long-term adverse cumulative effects on vegetation in the area would be minor. The beneficial impacts of several projects outside the project offset some of the adverse impacts from other projects. The contribution of alternative 1 to this cumulative impact would be relatively small.

Conclusion. Most of the natural vegetation in Saguaro National Park would not be affected under alternative 1. Minor long-term adverse effects on vegetation in localized areas would continue to be caused primarily by visitor activities. Long-term minor adverse cumulative effects on native vegetation would occur in the area. This alternative would contribute

a very small increment to the overall minor adverse cumulative effects. The levels of these effects would not be sufficient to constitute an impairment of park resources or values.

Wildlife

Analysis. Few of the actions of implementing alternative 1 would further affect the park's wildlife populations or habitats. Wildlife populations and habitat already have been altered by visitors and employees, as have wildlife habits and movements; this would continue. The use of the park by visitors is concentrated mostly in developed areas, such as along the Cactus Forest Loop Road, the visitor centers, and Picture Rocks Road. Animals sensitive to human activities already tend to avoid such areas.

Fire and trail crews would continue to use Manning Camp as a staging area. The level of activity would remain unchanged into the future. Wildlife sensitive to human activity would continue to avoid the area when the camp is in use.

The presence of hikers would continue to disturb some sensitive wildlife occasionally, such as mountain lions, but this disturbance would be temporary and would not affect the health or viability of the park's wildlife populations. The primary impact to wildlife would be the continued fragmentation of habitat within and outside the park boundaries.

Injury or death of wildlife from motor vehicles on roads would continue. Some animals probably would continue to be attracted by visitors offering food or to areas where food and garbage are left out. The long-term adverse effects on wildlife from all the above activities would be minor.

Cumulative Effects. The rehabilitation of Cactus Forest Loop Drive had negligible long-term adverse impacts on wildlife.

Outside the park, development in the Houghton area, Rincon/Southeast Subregional area, and Tucson Mountain Subregional area surrounding the park would continue to alter the types and distribution of habitat available to wildlife. The areas have been zoned to protect essential habitat while allowing for growth and expansion of Tucson. An increase in the number of structures and people in the currently undeveloped areas would reduce the amount of habitat available. Development in the Cienega Corridor would have the largest impact on wildlife; this is a key biological movement corridor for large mammals because it connects the Rincon Mountains with the Santa Rita and Empire Mountains. The long-term adverse impacts would be moderate.

The Cienega Conservation Corridor is being managed by a partnership composed of private, nonprofit, and governmental partners. Potentially connecting to the Las Cienegas National Conservation Area would allow this riparian corridor to continue with traditional recreational and ranching uses, which would continue to protect the area. This would have a long-term beneficial effect on wildlife. Increasing the protection of this biological corridor would allow easier movement of wildlife between mountain ranges.

The creation of the Ironwood Forest National Monument west of Tucson increased the level of protection on approximately 190,000 acres of land, of which almost 130,000 acres is federal property. This action would continue to have a long-term minor beneficial impact on wildlife in the region.

Overall, when the effects of alternative 1 were added to other actions within and outside the park, there would be moderate long-term adverse cumulative impacts on area wildlife populations. Alternative 1's portion of this impact would be relatively small.

Conclusion. Minor long-term adverse effects on park wildlife populations would continue

under alternative 1 in local areas, primarily in developed areas, from the presence of visitors and staff. Moderate long-term adverse cumulative effects would be expected on the area's wildlife populations. Alternative 1's portion of this impact would be relatively small. The level of these adverse effects would not be sufficient to constitute an impairment of park resources or values.

Threatened and Endangered Species and Species of Concern

Analysis. Alternative 1 would have increases in visitation that could affect the park's four threatened, endangered, candidate species, or state specie of special concern: lesser long-nosed bat, Mexican spotted owl, yellow-billed cuckoo, and cactus ferruginous pygmy-owl. Although visitor use levels could increase slightly in the future, these species would not likely be adversely affected because they most likely already avoid areas where they could be disturbed by human-caused noise or activity. Impacts on plant species of special concern would continue to be localized, but would not likely adversely affect plant populations over the long term.

Increases in visitors would most likely be concentrated in the Tucson Mountain District and the lower elevations of the Rincon Mountain District. This would be in or near potential cactus ferruginous pygmy-owl and lesser long-nosed bat habitat, but the people in these areas would not necessarily keep cactus ferruginous pygmy-owls and lesser long-nosed bats from dispersing into and using the areas. The cactus ferruginous pygmy-owl is active mostly during daylight hours. The presence of people could discourage nesting and feeding activities in high-use areas. However, cactus ferruginous pygmy-owls have not been confirmed to be in the park since 1995. The chance of encounters with people or disturbance due to human activity is low because off-trail travel is prohibited below 4,500 feet and the owls have a maximum elevation range of 4, 000 feet. Optimal habitat is abundant in the park, and the small amount that would be disturbed due to visitation would leave the owls plenty of acreage to nest and feed with minimal disturbance. The bats, which are mostly nocturnal, would be in the areas when few people were present.

Fire and trail crews would continue to use Manning Camp as a staging area. The level of activity would remain unchanged into the future. Manning Camp is in or near Mexican spotted owl habitat. Owls would continue to avoid the area and probably would nest elsewhere on the mountain during activities at the site. The activities may affect but would not likely adversely affect the owls.

Yellow-billed cuckoo habitat is primarily riparian areas. The primary habitat for the cuckoo would be at the Madrona and Rincon Creek area. The visitation levels at this location in the park should remain low as it difficult area to access due to the long hiking distance from any trailheads. The continued protection of the Madrona and Rincon Creek area with low visitation levels would continue to provide habitat for transient and breeding cuckoos.

Cumulative Effects. The rehabilitation of Cactus Forest Loop Drive had no effect on the lesser long-nosed bat, Mexican spotted owl, and the yellow-billed cuckoo. It was determined to not likely adversely affect the cactus ferruginous pygmy-owl.

Outside the park, development in the Houghton area, Rincon/Southeast Subregional area, and Tucson Mountain Subregional area surrounding the park would continue to alter the types and distribution of habitat. The construction of additional residential and commercial developments in open space between existing public lands would further increase habitat fragmentation.

Pima County has adopted the Sonoran Desert Conservation Plan and changed their land use zoning accordingly, which may reduce some impacts associated with continued development outside the park. This plan is designed to allow for growth while protecting the county's unique biological resources. The development in the region would not likely adversely affect special status species because they are following an approved habitat conservation plan. However, if the zoning is changed so that it no longer follows the conservation plan recommendations, the long-term impacts would be adverse and major.

The Cienega Conservation Corridor is being managed by a partnership composed of private, nonprofit, and governmental partners. Potentially connecting to the Las Cienegas National Conservation Area would allow this riparian corridor to continue with traditional recreational and ranching uses. This would have a long-term beneficial effect on special status species. Maintaining the biological corridor connecting the mountain ranges would ensure that a variety of riparian and desert habitats remain available.

The creation of the Ironwood Forest National Monument west of Tucson increased the level of protection on approximately 190,000 acres of land, of which almost 130,000 acres is federal property. This would not likely adversely affect and would most likely continue to have a long-term beneficial impact on special status species in the region.

The Gila topminnow is proposed to be reintroduced to the park by the U.S. Fish and Wildlife Service when habitat conditions support reintroduction. This would have a potential beneficial effect on the topminnow populations if efforts are successful.

Adding the above effects from other actions to those of alternative 1 would not likely adversely cumulatively affect the park's listed species and special status species. Alternative 1 would contribute a relatively small amount to these cumulative impacts.

Conclusion. Even with increased visitation, alternative 1 would not be likely to adversely affect the listed species in the park. The cumulative effects from alternative 1 and other actions would not be likely to adversely affect these species. Alternative 1 would contribute a relatively small amount to these cumulative impacts. The park's resources and values would not be impaired by any changes in the park's special status species.

Soils/Geologic Resources

Analysis. Soils would continue to be compacted and altered in local areas by hikers, backpackers, and horseback riders in the park. Soil compaction would continue in areas where vehicles are parked on road shoulders. In some areas, such as the Cactus Forest area in the Rincon Mountain District, erosion would continue from "social" trails created by visitors. These long-term adverse impacts would be minor because the effects would be localized and comprise a relatively small portion of the park.

Cumulative Effects. The recent rehabilitation of Cactus Forest Loop Drive had a short-term adverse impact on soils due to increased impervious area. Long-term impacts due to restoration of most of the soils compacted in this rehabilitation project were negligible and beneficial.

Outside the park, development in the Houghton area, Rincon/Southeast Subregional area, and Tucson Mountain Subregional area surrounding the park would continue to alter the soils surrounding the park. The construction of additional residential and commercial developments in open space between existing public lands would further increase the amount of impervious area.

Pima County has adopted the *Sonoran Desert Conservation Plan* and changed their land use zoning accordingly, which may reduce some impacts associated with continued development outside the park. The development in the region would have a moderate long-term adverse impact on soils. However, if the zoning is changed so that it no longer follows the conservation plan recommendations, the long-term impacts would be adverse and major.

The Cienega Conservation Corridor is being managed by a partnership composed of private, nonprofit, and governmental partners. Potentially connecting to the Las Cienegas National Conservation Area would allow this riparian corridor to continue with traditional recreational and ranching uses, which would have a long-term beneficial effect on soils in the region. Reducing the amount of development occurring in this corridor would minimize the impacts associated with expansion of Tucson. This action would have a long-term minor beneficial impact on soils in the region.

The creation of the Ironwood Forest National Monument west of Tucson increased the level of protection on approximately 190,000 acres, of which almost 130,000 acres is federal property. Development in the national monument should be limited. These actions would continue to have a long-term minor beneficial impact on soils in the region.

Overall, the impacts of other actions described above, in combination with the impacts of alternative 1, would have moderate, long-term adverse cumulative impacts on soils in the region. The contribution of alternative 1 to these cumulative impacts would be relatively small.

Conclusion. Alternative 1 would result in long-term minor adverse effects on soils in localized areas caused primarily by continued use of the park by visitors. The adverse cumulative effects on soils would be moderate and long-term; alternative 1's contribution to these cumulative impacts would be relatively small. The effects on soils from this alternative would not result in any impairment of park resources or values.

Soundscapes

Analysis. No new actions would be taken under alternative 1 that would result in appreciable changes in noise levels. Increases in visitation over time would result in a slight increase in vehicle traffic and associated noise, causing a long-term minor local adverse effect in the vicinity of roads and parking areas. Park machinery and visitors also would continue to generate noise, most of which would continue to be confined to primary developed visitor and administrative areas, including the Cactus Forest Loop and Picture Rocks Road. The long-term adverse impacts on soundscapes would be minor.

Cumulative Effects. At different times, short-term minor adverse effects from noise would be caused by park construction machinery, for example during the recent repaving of the Cactus Forest Loop and paving the scenic Bajada Loop Drive.

Outside the park, the construction of the Twin Peaks Interchange could cause temporary increased commuter traffic on through-park roads in the Tucson Mountain District, which would increase noise associated with vehicles in the park. Over the short term, the Twin Peaks interchange could reduce the volume of traffic in the park because commuters would have another available route. Over the long term, according to the Pima Association of Governments, Picture Rocks Road volume will increase due to the increased population on the west side of the park. This would be a negligible, long-term adverse impact on the soundscape. Commercial and military aircraft would continue to regularly fly over the park generating noise intrusions in both units. Aircraft would continue to have a short-term moderate impact on the soundscape during

the actual flyover, and a long-term minor adverse impact because the number of flyovers should continue to be relatively small.

Overall, these effects added to noise caused by visitors and park operations under alternative 1 would result in short-term moderate adverse and long-term minor adverse cumulative noise effects in local areas. Alternative 1 would have a modest contribution to these cumulative effects.

Conclusion. Most of Saguaro National Park would continue to be relatively quiet under alternative 1. However, there would continue to be long-term minor adverse effects on the park's soundscape in local areas, largely from visitation and administrative activities in developed areas. Noise from activities proposed in alternative 1 added to noise from other actions within and outside the park could result in short-term moderate adverse and long-term minor adverse cumulative effects in local areas. Alternative 1 would have a modest contribution to these cumulative effects. These effects would not constitute an impairment of park resources or values.

CULTURAL RESOURCES

Archeological Resources

Analysis. Archeological resources adjacent to or easily accessible to visitors from trails, roads, and picnic areas, and from designated back-country campgrounds in the Rincon Mountain District, would continue to be vulnerable to surface disturbance, inadvertent damage, and vandalism. Deterioration of cultural remains could result by way of a loss of surface archeological materials, alteration of artifact distribution, or a reduction of contextual evidence, which would be adverse impacts on archeological resources. However, continued ranger patrolling and emphasis on visitor education would discourage vandalism and inadvertent destruction of cultural remains, and any adverse impacts would be expected to be minimal if any.

As appropriate, additional archeological surveys would precede any ground disturbance associated with excavation or the demolition of structures, such as the razing or removal of the Civilian Aeronautical Administration Building in the Madrona Area. National register eligible or listed archeological resources would be avoided to the greatest extent possible and no adverse effects would be anticipated. If such resources could not be avoided, an appropriate mitigation strategy would be developed in consultation with the Arizona state historic preservation officer.

Cumulative Impacts. Past development in the park such as trails, roads, housing, visitor centers, Manning Cabin, the later tent-platform camping at Manning Camp for trail workers and fire fighters, and the 1933–1941 construction of frame and adobe structures and rustic stone picnic facilities by the Civilian Conservation Corps may have resulted in disturbance. There could have been loss of some archeological resources during excavation and construction activities, adversely impacting archeological resources.

In addition, agricultural, ranching, and mining practices; the development of the historic town of Tucson and current city — with its rapidly growing population and associated new residential areas and industrial parks, such as the University of Arizona Science and Technology Park, including the metropolitan and surrounding regional development of pedestrian walkways and hiking trails and routes and trails for bicycles on municipal and county lands and those of other federal agencies — may also have adversely disturbed archeological resources. Some of these types of activities continue, such as the growth and expansion of residential areas impinging upon Saguaro National Park, and could also result in future adverse impacts on archeological resources.

As described above the impacts associated with implementing alternative 1 would result in predominantly no adverse effects on the park's archeological resources. However, the few potential adverse impacts associated with alternative 1, in combination with the adverse impacts of other past, present, and reasonably foreseeable future actions, both within and outside the park, would result in an adverse cumulative impact. The adverse impacts of alternative 1 would only contribute minimally to the adverse cumulative impact.

Conclusion. Continued management actions under the no-action alternative would include minimal new construction, and no new adverse impacts on archeological resources would be anticipated. In the event that impacts on national-register-eligible archeological resources could not be avoided, a memorandum of agreement, in accordance with 36 CFR Part 800.6, *Resolution of Adverse Effects*, would be negotiated between Saguaro National Park and the Arizona state historic preservation officer (and/or the Advisory Council on Historic Preservation, if necessary). The memorandum of agreement would stipulate how the adverse effects would be mitigated.

The few potential adverse impacts associated with alternative 1, in combination with adverse impacts of actions by others, would result in an adverse cumulative impact. The adverse impacts of alternative 1 would only contribute minimally to the adverse cumulative impact.

Because there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Saguaro National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Cultural Landscapes

Analysis. As settings for continuity or change, the desert and mountainous areas of Saguaro National Park are important character-defining features of the various potential cultural landscapes suggested in the cultural affected environment section of this document. Under alternative 1, closure and revegetation of social trails would continue, which would result in no adverse effects on potential cultural landscapes. The revegetation would have a beneficial impact upon such landscapes by returning them to more of a semblance of their historic appearances in the natural setting of the Sonoran Desert. There would be no impacts on any cultural landscapes from new construction because none would occur under alternative 1.

Before the demolition of any structures, the structures would be evaluated to determine if they are contributing elements to a national-register eligible cultural landscape. If removal of a structure that is a contributing element to a national-register eligible cultural landscape would occur, appropriate documentation recording the structure would be prepared. This would be in accordance with Section 110 (b) of the National Historic Preservation Act of 1966, as amended. Submittal of the documentation would be to the NPS Historic American Buildings Survey / Historic American Engineering Record / Historic American Landscapes Survey (HABS/HAER/HALS) program.

Cumulative Impacts. Past development in the park — such as mining and lime-making activities, trails, roads, housing, visitor centers, Manning Cabin, the later tent-platform camping at Manning Camp for trail workers and fire fighters, and the 1933-1941 construction of frame and adobe structures and rustic stone picnic facilities by the Civilian Conservation Corps — has resulted in the creation of potential historic cultural landscapes. With the cessation of original land

uses, certain structures, such as the lime kilns, have deteriorated.

Prehistoric and historic human occupation and habitation including agricultural, ranching, and mining practices and the development of the historic town of Tucson and the current residential and industrial spread of the city have contributed to the history and current conditions of the potential cultural landscapes referred to in the cultural affected environment section of this document. Some of these types of activities continue, such as the growth and expansion of residential areas impinging upon Saguaro National Park, and could result in future adverse impacts on cultural landscapes.

The recent (2006) rehabilitation of Cactus Forest Drive was done in accordance with the 1995 *Secretary of the Interior's Standards for the Treatment of Historic Properties,* and there was no adverse effect.

As described above, the impacts associated with implementation of alternative 1 would result in predominantly no adverse effects to the park's potential cultural landscapes. However, the few potential adverse impacts associated with alternative 1, in combination with the adverse impacts of other past, present, and reasonably foreseeable future actions, both within and outside the park, would result in an adverse cumulative impact. The adverse impacts of alternative 1 would only contribute minimally to the adverse cumulative impact.

Conclusion. No adverse effects would be associated with revegetation of social trails because such rehabilitation would have a beneficial impact upon potential cultural landscapes by returning them to more of a semblance of their historic appearances in the natural setting of the Sonoran Desert.

Continued management actions under the no-action alternative would include minimal new construction, and no adverse impacts on cultural landscapes would be anticipated. In the event that impacts on any national-register-eligible cultural landscapes could not be avoided, a memorandum of agreement, in accordance with 36 CFR Part 800.6, *Resolution of Adverse Effects*, would be negotiated between Saguaro National Park and the Arizona state historic preservation officer (and/or the Advisory Council on Historic Preservation, if necessary). The memorandum of agreement would stipulate how the adverse effects would be mitigated.

The few potential adverse impacts associated with alternative 1, in combination with the adverse impacts of actions by others, would result in an adverse cumulative impact. The adverse impacts of alternative 1 would only contribute minimally to the adverse cumulative impact.

Because there would be no adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Saguaro National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Ethnographic Resources

Analysis. Saguaro fruit harvesting by the Tohono O'odham in the southwestern corner of the park would continue via the annual issuing of a special permit, which would be a minor, beneficial, long-term impact for the Tohono O'odham because it would help perpetuate Tohono O'odham culture.

Continuing the traffic conditions of often high speeds and high noise levels on Sandario and Kinney roads would continue a minor, adverse, long-term impact on the area selected by the Tohono O'odham as an ethnographic

resource to harvest saguaro fruit because it would continue to detract from the area's tranquility and make it less suitable for this fruit gathering practice.

Cumulative Impacts. The past, current, and foreseeable park practice of tolerating high-speed/high noise level traffic conditions on Sandario and Kinney roads would continue to adversely affect the harvesting of saguaro fruit by detracting from the area's tranquility and thus making it less suitable for the traditional use associated with plant gathering. This adverse impact would be minor and long term on the Tohono O'odham.

The past park practice of allowing the harvesting of saguaro fruit by the Tohono O'odham in the park's Tucson Mountain District would help support the practice of gathering saguaro fruit in the region (on the Tohono O'odham reservation), thus helping to perpetuate Tohono O'odham culture. This beneficial impact would be minor and long term on the Tohono O'odham.

As described above, the impacts associated with implementation of alternative 1 are both beneficial and adverse on the park's ethnographic resources. Accordingly, the actions associated with alternative 1 would contribute both beneficial, minor, long-term impacts and adverse, minor, long-term impacts to any cumulative impact. The beneficial impacts of implementing alternative 1, however, would be very small components of the minor, beneficial, and long-term cumulative impact associated with other past, present, and reasonably foreseeable actions both within and outside the park.

Conclusion. Implementing alternative 1 would impact adversely at a minor intensity level for the long term harvesting of saguaro fruit in the park area selected for this purpose as an ethnographic resource by the Tohono O'odham because high speed/high noise traffic would continue and would likely increase in this area. There would be a long-term minor beneficial impact from continuing the fruit-collecting practice in the park via permit.

There would be minor, beneficial, and long-term cumulative impact associated with other actions both within and outside the park; implementing alternative 1 would be a small contributor to these cumulative impacts.

Because there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Saguaro National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant NPS planning documents there would be no impairment of park resources or values.

Historic Structures

Analysis. To appropriately preserve and protect national-register-listed or -eligible historic structures, all stabilization, preservation and rehabilitation efforts, as well as daily, cyclical, and seasonal maintenance, would be undertaken in accordance with the 1995 *Secretary of the Interior's Standards for the Treatment of Historic Properties*. Stabilization, preservation, and rehabilitation would have no adverse effects upon historic structures and cultural landscapes. Sixty-five structures are entered in the NPS List of Classified Structures, which means that these entries are either listed in the National Register of Historic Places or eligible for listing. They would be managed for historic preservation. This List of Classified Structures is given in appendix H.

Civilian Aeronautical Administration Building at Madrona. The Civilian Aeronautical Administration (CAA) building in the Madrona Area of the Rincon Mountain District would be monitored. The result of the

action of alternative 1 would be no adverse effect on this historic property because periodic monitoring would determine what aspects of the CAA building might need stabilization from time to time to preserve it.

Manning Cabin and Manning Dam at Manning Camp. Continuing to use Manning Camp for fire crew activities as part of a major fire-fighting base in the Rincon Mountains means that the existing level of general wear and tear on the historic fabric of the cabin would continue. There would be an adverse impact on the historic fabric. This conclusion is based upon findings of the recent report "Condition Assessment, Evaluation and Recommendations for Repair and Preservation, Manning Cabin at Manning Camp" (NPS 2005a). There would be no change regarding Manning Dam and no adverse effect.

Cumulative Impacts. Over the years, historic structures in the park, such as remnant lime kilns, adobe, and other remains of Camp Pima, and the scant remains of the Freeman Homestead, have been adversely impacted by the wear and tear associated with visitation and by natural processes like weathering. Also, change has occurred among the CCC stone picnic structures, so much so that "the only structures that have survived in their original appearance are the bathrooms" (NPS 1987a:225). Historic fabric in the form of adobe and brick houses associated with the settlement and subsequent growth of Tucson has been lost in the region, which is an adverse effect. Related to these houses, lime "for use as mortar or whitewash" (NPS 1987a:112) came from the lime kilns in what is now the park. Historic fabric has been lost — an adverse impact — because of settlement, mining, and ranching, and because of the spread of urban population growth and modernization.

As a historic structure, Cactus Forest Drive would continue to be preserved by maintaining its naturalistic and rustic Civilian Conservation Corps road design. This design accommodates scenic views and shows natural features to their best advantage — like stands of native cacti. Distinctive construction features such as retaining walls and guard walls and culverts of native stone would continue to be rehabilitated for historic preservation in accordance with the secretary's standards. There would be no adverse effect from continuing these actions.

As described above, the impacts associated with implementation of alternative 1 are both not adverse and adverse on the park's historic structures. Accordingly, the actions associated with alternative 1 would contribute both no adverse and adverse impacts to any cumulative impact. The adverse impacts of implementing alternative 1, however, would be very small components of the cumulative adverse impact associated with other past, present, and reasonably foreseeable actions both within and outside the park.

Conclusion. There would be no adverse effect concerning the monitoring of the CAA building, and there would be an adverse effect with the continuation of existing fire management and trail maintenance operations on the historic fabric of Manning Cabin at Manning Camp. There would be no change regarding Manning Dam and no adverse effect.

The overall cumulative impact on historic structures would remain adverse; the impacts of implementing alternative 1 would be a very small component of this cumulative impact.

Because there would be no adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Saguaro National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant National Park Service planning documents, there would be no impairment of the park's resources or values.

VISITOR EXPERIENCE

Range of Recreational Opportunities

In this alternative, visitor experiences of the park's resources would continue to be mostly positive. Visitors would continue to have access to high-quality recreational opportunities, including close interaction with the sights and sounds of the Sonoran Desert, which is considered the most important element of most visitors' experiences. Therefore, continuing to provide these high-quality opportunities would result in a continued long-term major beneficial impact for visitors.

During scoping, most respondents acknowledged their enjoyment of the park's recreational opportunities and suggested that the amount of opportunities should be maintained close to current levels. This alternative would continue existing opportunities, resulting in a continuing long term major beneficial impact. However, during scoping, some respondents mentioned the need for increased opportunities for bicyclists, especially to provide connections to regional trails on other public lands adjacent to the park. Bicycling opportunities would remain limited in terms of the number of trail opportunities and the lack of connections to regional trails in this alternative, resulting in a continuing long term moderate adverse impact for visitors seeking this type of recreational opportunity.

Some respondents mentioned the need to reduce use of the park by bicyclists and horseback riders, citing concern over user conflicts and potential resource impacts, particularly from horseback riders on high elevation trails. The existing mix of recreation opportunities would be maintained in this alternative, so visitors who are experiencing user conflicts from different types of recreational users on the same trails would continue to experience a long term minor adverse impact in this alternative.

Further, there was some concern over the amount of automobile traffic on roads passing through the park, particularly the Tucson Mountain District, which impacts scenic driving opportunities as well as poses potential risks to visitor safety. Under this alternative current impacts from commuter traffic on through-park roads would continue, and it is likely that this type of use would only increase, resulting in a long term major adverse impact on scenic driving opportunities.

Opportunities for Solitude and Getting in Touch with Nature

The park continues to provide outstanding opportunities for solitude and getting in touch with nature in an increasingly urban setting. During public scoping, many respondents indicated that the wilderness values of the national park, such as naturalness, opportunities for self-discovery, quiet, scenic vistas, and solitude, made the park a unique and special place and should be protected for such values. The wilderness areas at Saguaro National Park are particularly valued because they provide the highest level of protection for the park's opportunities for solitude and primitive recreation, which are becoming rare in the region. The continuation of these types of opportunities in both units of the park is a long-term major beneficial impact.

Some of the current impacts to opportunities for solitude are related to traffic conditions on Picture Rocks and Sandario Roads, which are near the designated wilderness area in the Tucson Mountain District. The current volume and speed of automobiles affect the natural ambient soundscape for up to 2 miles away from the roads, much of which is designated wilderness (Ambrose and Florian 2006). This alternative would not affect the current traffic conditions on the road, allowing the long-term moderate adverse impact on opportunities for solitude to continue in the immediately adjacent wilderness area.

Visitor Access, including Access for Visitors with Disabilities

The park currently has two main access points to both units near each of the main visitor centers. In addition, there are several trailhead access points around the park boundary to provide access to the park's trail systems and day use picnic areas.

During scoping, some respondents expressed concerns over high levels of use and access to certain portions of the park's wilderness. There was some discussion about increasing access from non-designated locations along the park's boundary by neighbors to the park that may damage resources and increase conflicts between recreationists. This alternative would not take any steps to alleviate these impacts, resulting in a continuing long-term minor adverse impact. In contrast, a number of respondents during the scoping process stated that the park needs additional access points, especially in some of the park's expansion areas, to provide access. Implementation of the no-action alternative would result in a continuing long-term minor adverse impact for visitors seeking these new access opportunities.

Another access-related concern is safety and user conflicts occurring at the Broadway, Douglas Springs, and Kings Canyon trailheads due to high levels of use, haphazard parking, and pedestrian and automobile conflicts. This alternative would maintain the status quo, thereby continuing a long-term moderate adverse impact for visitors that use these areas to access the park.

Access to the Madrona/Chimenea area has also been a topic of interest for many local residents that frequently visit the park. There has been a long-term debate over the appropriate level of access to this sensitive riparian area. This alternative would continue current access to this area, which precludes most visitors except those residents directly adjacent to the park's boundary in the X-9 ranch subdivision. This would continue to be a long term minor adverse impact on visitors seeking more access to the site.

Another access-related concern is the amount of automobile traffic on roads passing through the park, particularly the Tucson Mountain District, which impacts scenic driving opportunities, as noted above, as well as general visitor access opportunities to the Tucson Mountain District. The amount of traffic and high levels of speed on Picture Rocks Road conflict with visitors wishing to access this district via Interstate 10 because of the unsafe and unpleasant road conditions. Under this alternative, park staff would not direct or encourage visitors to use this route to enter or exit the park, continuing a long-term moderate adverse impact on visitor access opportunities.

One of the topics of most interest to the park's partners and the public was the connection of regional trails to the park, providing new travel routes through the park to other public lands. This alternative would maintain current trail access points, continuing a long-term moderate adverse impact for visitors interested in connections with regional trails.

Finally, the park has several facilities, including one interpretive trail in each district that is accessible to disabled visitors. Many respondents during the scoping process indicated support for more trail opportunities for disabled visitors. This alternative would maintain the limited accessible trail opportunities in each district, continuing a long-term minor adverse impact for visitors interested in more accessible trails.

Opportunities for Orientation, Education, and Interpretation

There are visitor centers at both districts of the park that offer numerous programs and services for visitor orientation and education. However, the Rincon Mountain District

visitor center was designed and built in the 1950s, and the exhibits have seen only superficial upgrades since then. Also, the facility can no longer handle the volume of visitors that it now receives, which restricts some visitors from getting information during peak times. The public commented during the scoping effort for this management plan on the need to update the Rincon Mountain District visitor center. This alternative would maintain the current visitor center, thereby continuing a long-term moderate adverse impact on visitor opportunities for orientation and education in this district.

In addition, the public commented during scoping that there was a need to expand interpretation and education opportunities, including guided programs and opportunities outside the park boundaries (e.g., school partnerships). Further, the public noted the need for reaching out to a diverse local community for resource and cultural education opportunities, including improved meeting places in the park for school/ community group programs. This alternative would not provide any additional program or partnership opportunities or facilities for education and interpretation services, continuing a long-term minor adverse impact.

Visitor Safety

There have been 155 accidents (3 fatalities and 42 injuries) on Picture Rocks Road and 95 accidents (1 fatality and 40 injuries) on Sandario Road between 1998 and 2005 (Saguaro National Park, Chief Ranger, pers. comm. with Kerri Cahill, NPS Denver Service Center, 7/2006). In addition to actual safety conflicts, there are perceived safety conflicts on the road due to high volumes and speeds of traffic during commuting hours. Many respondents commented on their concerns of safety along the through-park roads, particularly Picture Rocks Road. Many respondents asked that the National Park Service make safety improvements to the roadways. This alternative would not change the current management of the roads that cross through the park, continuing a long-term moderate adverse impact to real and perceived visitor safety in the Tucson Mountain District unit.

Safety information would continue to be available, although occasional crowding at the Rincon Mountain District visitor center would continue to make it difficult to gain a comprehensive understanding of safety factors, leading to a long-term minor adverse impact.

Cumulative Effects

Several recent or proposed projects in the region may contribute to cumulative impacts on the visitor experience at both districts. Regarding the range of recreational opportunities, the Pima Association of Governments' *2030 Transportation Plan* proposes the addition of the Twin Peaks highway interchange at Interstate 10, which might, in the short term, alleviate some of the commuting traffic pressure along Picture Rocks Road, a continuing negative impact in this alternative. If implemented, in combination with alternative 1, this interchange might improve the traffic conditions on this road, which would improve park scenic driving opportunities and result in a short-term cumulative minor beneficial impact.

However, over the long term, the Pima Association of Governments predicts that the traffic volume on Picture Rocks Road will increase, even with the proposed interchange, due to the increased growth of residential development on the west side of the park. With the increase of traffic volume on Picture Rocks Road over the long term, the proposed interchange, in combination with alternative 1, would have a long-term negligible beneficial cumulative impact on scenic driving opportunities for park visitors.

Other projects that may influence the range of recreational opportunities in Saguaro National Park include the designation of new public lands near both districts of the park. The Las Cienegas National Conservation Area is south of the Rincon Mountain District and the Ironwood Forest National Monument is near the western boundary of the Tucson Mountain District. Both of these new public conservation lands are managed by the Bureau of Land Management and are undergoing planning at this time.

It is likely that these new lands would improve nature-based recreation opportunities in the region and help balance the range of recreational opportunities offered to regional visitors, including people that may visit Saguaro. The Ironwood Forest National Monument would provide extensive motor touring and bicycling opportunities, and the Las Cienegas National Conservation Area would increase the amount of wildlife watching and primitive hiking opportunities that are available nearby. In summary, recreational opportunities on these new designated conservation lands, in combination with the continuing opportunities at Saguaro under alternative 1, would be a long-term moderate beneficial cumulative impact.

Regarding opportunities for solitude and getting in touch with nature, the proposed Twin Peaks interchange would likely, in the short term, affect current impacts on opportunities for solitude that are related to traffic noise near the designated wilderness area in the Tucson Mountain District. The short-term improved traffic conditions resulting from the proposed interchange, in combination with alternative 1, would be a short-term negligible to minor beneficial cumulative impact on opportunities for solitude in the surrounding wilderness area. However, as noted above, the traffic volume on Picture Rocks Road is expected to increase in the long term even with the proposed interchange, leading to a long-term negligible beneficial cumulative impact on opportunities for solitude in the surrounding wilderness area.

Regarding visitor access, the proposed Twin Peaks highway interchange at Interstate 10 might, in the short term, improve visitor access opportunities to the north end of the Tucson Mountain District. However, with the long-term increase in traffic volumes, this proposed interchange, in combination with alternative 1, would be a long-term negligible beneficial cumulative impact on visitor access opportunities.

There are no projects contributing to cumulative impacts regarding opportunities for orientation, education, and interpretation. Therefore, there would be no cumulative impacts on orientation, education, and interpretation under alternative 1.

The proposed Twin Peaks interchange would also likely contribute to cumulative impacts on visitor safety. Current conditions, which would continue in this alternative, result in real and perceived visitor safety conflicts along Picture Rocks Road. The interchange, in combination with alternative 1, would likely improve traffic conditions by reducing use levels and changing the pattern of use from predominately commuters to national park visitors, resulting in slower speed levels, a short-term moderate beneficial cumulative impact on visitor safety. However, the increase in traffic volumes over the long term would result in a long-term negligible beneficial cumulative impact on visitor safety from the proposed interchange.

Conclusion

Alternative 1 would result in major beneficial impacts from continued opportunities to participate in diverse recreational opportunities that bring visitors in close contact with one of the most interesting and unusual collections of desert life in the United States, including the highly valued opportunities for

solitude and getting in touch with nature. However, minor to major adverse impacts on the visitor experience from user conflicts on trails, limited bicycling opportunities, increasing use in wilderness areas that may threaten visitors' opportunities for solitude, and increasing commuter traffic along through-park roads would continue.

The designation of new public land conservation areas near both districts of the park in combination with the recreational and visitor experience opportunities provided by Saguaro would have moderate beneficial cumulative impacts on the range of recreational opportunities and opportunities for solitude and getting in touch with nature. Also, in combination with alternative 1, the proposed new Twin Peaks interchange would have negligible long-term beneficial cumulative impacts on the range of recreational opportunities, visitor access, and visitor safety due to the increase in residential development on the west side of the park that would likely offset any improvements of traffic conditions on Picture Rocks Road resulting from the interchange.

SOCIOECONOMIC ENVIRONMENT

Analysis

Alternative 1 provides for a continuation of national park management as it currently exists. Natural resources would continue to be preserved, and the range of visitor uses and experiences would continue to be provided as they were outlined under the 1988 *General Management Plan*. Based on anticipated population growth both locally and regionally, the number of potential visitors to the national park would likely increase in the long term. However, with no enhanced visitor uses and experiences occurring under alternative 1, visitation may not increase proportionately with population growth in the area. This could result in a minor long-term reduction of the importance of national-park-generated economic activity (i.e., direct spending by national park visitors and secondary distribution of spending in the community) relative to the dynamics of the local changing and growing economy.

According to the Money Generation Model, total visitor spending associated with the national park was estimated at $39.67 million in 2003. This level of use translated in direct effects estimated at $33.44 million in sales, $5.59 million in personal income, 821 jobs, and $17.92 million in value added, and secondary effects estimated at $15.41 million in sales, $5.59 million in personal income, 218 jobs, and $9.66 million in value added. Therefore, the total effects of the national park in 2003 were estimated at of $48.85 million in sales, $17.52 million in personal income, 1,039 jobs, and $27.58 million in value added (NPS 2006d). If visitation does not increase proportionately with population and economic growth in the community, the relative importance of the economic activity associated with the national park (i.e., the impact of visitor spending in terms of sales, personal income, jobs, and value added from the money generation model) may lessen, even if visitor spending dollars increase from year to year. Ultimately, this continued pattern could reduce abilities to maintain current standards of service in the park. This would produce a moderate long-term adverse impact on the park and the local community. To place this in context, total domestic visitor spending in Arizona in 2003 was estimated at $12.14 billion (Arizona Office of Tourism 2004). Therefore, the estimated $39.67 million in spending associated with Saguaro National Park represents less than 1% of the state's tourism sector.

Preservation, protection, and interpretation of cultural resources would continue under alternative 1 as they exist under the 1988 *General Management Plan*. These actions further the passive use value of the park, which refers to the social value in the knowledge that the scarce resources of the park exist and are protected for future

generations. Passive use values are non-market values; they have economic value even if no money changes hands. These passive use values can be held by the surrounding community, including those people that regularly, rarely, or never visit the national park. In addition, as there is increasing urbanization in the vicinity of Saguaro National Park, the relative economic value resulting from the presence of a large open-space, recreation, and natural area amenity such as the national park may create continued gains in property values and support of resource-based industries such as outdoor recreation and tourism. Although these impacts are difficult to quantify, numerous studies have documented that open space can trigger local property value increases and other tangible economic gains (Muro 2002). The relative importance of open landscape, scenic vistas, and recreational opportunities and amenities represented by Saguaro National Park may increase in terms of relationship to economic development and quality of life gains for the surrounding community.

Access to the Madrona/Chimenea Area would continue to be limited under alternative 1. Although this does not have an economic impact with regard to Saguaro National Park or the community, this action has non-market social value in that it preserves cultural resources and maintains a sense of place for those who have attached personal, community, or cultural value to the resources and environment in the Madrona/Chimenea area. Limitation of access to this area would create a moderate long-term adverse impact on those excluded or inconvenienced.

Continued Saguaro National Park visitation would potentially result in fiscal impacts on the local community in terms of congestion, traffic, pollution, law enforcement, road repairs, or other public services. The existing level of such impacts is minor in context of the surrounding community and would not change appreciably with implementation of alternative 1. However, in terms of traffic and road issues, SNP visitation use would continue to have an additive impact with non-park commuter traffic through the Tucson Mountain District along Picture Rocks Road. Commuter traffic through Saguaro National Park would continue as it currently exists under the no-action alternative, potentially creating a diminished visitor experience, resource damage, and safety issues. Based on traffic studies and population projections, commuter traffic through the Tucson Mountain District along Picture Rocks Road is expected to increase substantially over the next several years. Excessive traffic volume and speeds could result in costly damage to vegetation and wildlife, and would generate costs for road maintenance and repair and increased law enforcement. Increased roadway use also increases the potential for traffic accidents, which produces additional costs and can result in personal injury and potential loss of life.

Increased regional population would most likely result in increased park use, creating the potential for social impacts in the form of increased user conflicts and fiscal impacts to the local community associated with use of the park. Without additional upgrades and services, visitation could diminish relative to the growing population and economy, resulting in a relative decrease in income to the park and the surrounding community from recreational and tourist use. Adverse impacts would most likely be negligible in terms of the overall local economy.

Cumulative Impacts

Past, present, and future population growth and urban development would continue to impact the social and economic environment. As the population in the area increases, demand for accessible recreation areas will also increase. Interactive effects of increasing urbanization are highlighted in context of the assessment of socioeconomic impacts of alternative 1 (i.e., the relative importance of

Saguaro National Park to the local social and economic environment). However, urban growth results in changes to land use; changes in demographics; perceived changes in quality of life; ways in which people live, work, play, and relate to one another; community uniqueness; social relationship/interactions; community organization; and people-place connections/sense of place. There are increasingly perceived conflicts between traditional and new attitudes and values. The park's general management plan has interactive and additive impacts with the changing socioeconomic dynamics of the community. Overall, the implementation of alternative 1 in combination with population growth and increasing urban development would continue the park's role in providing islands of open space and wilderness for the community. This would in result in a moderate to major long-term beneficial impact for those areas closest to the park districts and dissipate to minor levels in context of the community as a whole.

Within Saguaro National Park, the primary project having the potential to provide cumulative effects is the recent (fall 2006) Cactus Forest Loop Drive Rehabilitation project in the Rincon Mountain District. Completion of this project enhances the visitor experience. Economic gains were realized from increased employment opportunities during the construction and maintenance phases and the protection of natural resources through improved traffic coordination. Resource damage and expenditures to replace and repair damage is decreasing. These socioeconomic impacts are additive to those that would occur under alternative 1. Although there would be some costs associated in the short term, the effect associated with completion of the Cactus Forest Loop Drive rehabilitation project, in conjunction with the impacts of alternative 1, would result in a minor long-term beneficial cumulative effect.

Outside Saguaro National Park, a number of land use and resource planning efforts are underway. These planning efforts would serve to coordinate activities in the region. Natural resource planning efforts are underway for the Cienega Conservation Corridor, Ironwood Forest National Monument, Las Cienegas National Conservation Area, and the *Sonoran Desert Conservation Plan*. Each of these plans places an emphasis on preservation of open space and natural resources. Together, and in addition to the park's general management plan, these plans substantially affect collective policy for open space and natural resource preservation. Planning for growth and urban development for which future infrastructure and services must be provided is the focus of the *Pima County Comprehensive Plan*, the *Houghton Area Master Plan*, the *Rincon/Southeast Subregional Plan*, and the *Tucson Mountains Subregional Plan*. The outcomes of these plans would have a direct impact on visitation levels at Saguaro National Park and the need for recreational services for residents of these surrounding communities.

Finally, The Pima Association of Governments' *2030 Transportation Plan* outlines the transportation projects and goals for Pima County, including establishing the Twin Peaks Interstate 10 Interchange located north of the Tucson Mountain District. Construction of this new interchange would create an alternative route for commuters along Interstate 10 between Avra Valley and Picture Rocks Road. This action would, potentially lessen traffic along Picture Rocks Road through Saguaro National Park while simultaneously decreasing the associated natural resource damage and the costs to maintain the roadway that is currently being experienced as a result of current heavy use volumes. Combining the impacts of implementing the various transportation plans along with the impacts of the no action alternative would result in a major long-term beneficial cumulative effect on the park and surrounding community.

Conclusion

Moderate long-term adverse socioeconomic effects would occur with continued implementation of alternative 1, as the park may have difficulty maintaining its high standard of service while keeping pace with local and regional population growth and urban development. Without development of improved visitor experience and access, visitation might not increase proportionately with population and economic growth. In this case, the relative importance of the economic activity associated with the park in terms of visitor spending, sales, personal income, and jobs would decrease.

Taking into consideration the impacts of projected population growth, in conjunction with the impacts of alternative 1, moderate long-term adverse cumulative impacts would be expected to occur. Current management under alternative 1 by itself would have a relatively small contribution to the overall cumulative effect. Likewise, the effect of concurrently implementing other management plans for the surrounding areas and implementation of new urban planning areas would create a moderate long-term adverse impact on the park's socioeconomic contribution to the area if no improvement to visitor experience and access were to occur. Social value that preserves cultural resources and maintains a sense of place for those who have attached personal, community, or cultural value to the localized resources and environment would remain unchanged under implementation of alternative 1.

TRANSPORTATION

Under this alternative, the park would experience growth and traffic-related impacts from the rapidly expanding Tucson metropolitan area rather than from park-related actions. The park would not construct new or modify existing transportation facilities, and would continue to manage transportation infrastructure and issues with current methods (traffic signs and law enforcement ranger patrols).

Tucson Mountain District

Circulation. The road network in the park would remain as it is, as would the network in the area surrounding this district. Although Picture Rocks Road is a major access route for western Pima County, it is not a primary entrance route — the park designates Kinney Road for that purpose.

Although there would be no direct changes in circulation, there would be some indirect impacts on Twin Peaks Road and Kinney Road if non-visitor users divert there to avoid congestion and safety problems on Picture Rock Road. There would be long-term minor adverse effects on both visitors and non-visitor users from traffic diversion to Twin Peaks Road and Kinney Road, due to increased travel time and vehicle miles traveled associated the traffic diversion.

Several roadways in, adjacent to or near the district are at or near capacity: Picture Rocks Road (portions are within the park), Wade Road, and Ina Road. All three of these roads are along the path of commuters going to and from Tucson. The capacity problems experienced on Picture Rocks Road are largely confined to commuter peaks on weekdays, so there is some off-setting capacity between peak times for non-visitor users (morning and evening rush hours weekdays) and visitors (typically 10 am-4 pm weekdays and on weekends)

If congestion and safety levels on Picture Rocks Road cause some non-visitor users to choose other routes, they would likely divert to either Twin Peaks Road (once it is connected to I-10) or Kinney Road (resulting in some impacts to Sandario Road as well). Diversion of non-visitor users from Picture Rocks Road would not likely create any additional capacity for Picture Rocks Road;

like "water seeking its own level" any capacity gained by traffic diversion is likely to be offset by others seeking to take advantage of any temporary capacity. Traffic diversion from Picture Rocks Road would result in long-term, minor adverse impacts for users on Twin Peaks Road and Kinney Road as a result of increased traffic volumes and congestion. Potential traffic diversion would have a long-term negligible beneficial effect for all users on Picture Rocks Road, Ina Road, and Wade Road, since these roads are nearing capacity.

The scenic Bajada Loop Drive circulation and roadway alignment currently requires visitors to exit the park during their drive on this slow-moving, scenic dirt road and temporarily travel along Sandario Road, a regional arterial with a posted speed limit of 50 mph. Not only is this brief change in driver expectation and environment jarring for the visitor experience, slower-moving visitors also experience user conflicts entering and exiting the faster traffic on Sandario Road for such a short travel distance. Also, some portions of the loop are one-way and some are two-way, creating a somewhat confusing circulation pattern within the park that creates long-term, minor adverse impacts for visitors, and no impact on non-visitor users.

Safety. There are numerous, well-documented and on-going safety concerns on Picture Rocks Road. This scenic roadway is now predominately traveled by non-visitor users (i.e., commuters from western Pima County). Excessive speeds for the design of the road, visitor/non-visitor user conflicts (between commuters and visitors, and trail users and through traffic), lack of pullout parking, and high accident rates all contribute to an environment where the risk of injury to visitors remains substantial.

The Picture Rocks Road/Golden Gate Road intersection is on a tight curve, resulting in sight distance and other safety concerns. A continuation of these conditions under alternative 1 would result in a long-term, major adverse impact on visitors and non-visitor users. If congestion and safety conditions reach levels that are unacceptable to some non-visitor users, they would likely divert to either Twin Peaks Road or Kinney Road. As traffic increases on Picture Rocks Road, slower speeds would result due to congested conditions; slower speeds may divert commuters to Kinney Road and Sandario Road. This diversion would result in a "ripple effect" where visitors would be impacted by faster-moving commuter traffic at additional locations (additive impacts are in effect here, since this portion of Sandario Road has a very high accident rate). Non-visitor users would experience long-term, minor, adverse impacts from the park's management of Picture Rocks Road in alternative 1 because of safety problems associated with user conflicts with slower-moving visitors.

Having a portion of the scenic Bajada Loop Drive on Sandario Road would result in a long-term, moderate to major adverse impacts on visitors and non-visitor users because of the high accident rate on this section of Sandario Road. Almost a third of the total accidents on Sandario Road occur in the section of roadway between Golden Gate Road and Kinney Road, and the accident rate

TABLE 22. PICTURE ROCKS ROAD ACCIDENTS: MAJOR CONTRIBUTING FACTORS, 1998-2003

	Speed	Alcohol	Inattention/ Recklessness	Turning	Other	Animal	TOTAL
Number of incidents	**81**	18	16	2	2	2	121
Overall: 3 fatalities, 79 injuries. Most accidents occurred between Golden Gate Road and Box Canyon, within park boundaries (all fatalities occurred in this area)							
Accident compilation: DEA 2006							

on this corridor is rising steadily in the last five years (speed and turning are listed as the top contributing factors). Accidents would likely be reduced along Sandario Road if the park removed this user conflict.

Parking. Parking lots in this district are well under capacity (with the exception of the Esperanza trailhead, which is full on weekends, but additional parking is available near by). The lack of parking pullouts on Picture Rocks Road is an on-going concern, because it could alleviate some of the current conflicts between slower-traveling visitors and the faster-moving non-visitor users (it would also offer visitors the opportunity to pull-off and enjoy scenic views safely). Alternative 1 would result in long-term, minor adverse impacts to parking for visitors and non-visitor users.

Cumulative Effects. In its 2030 Regional Transportation Plan, the Pima Association of Governments proposes a series of transportation infrastructure improvements that could impact circulation, safety, and congestion inside and near the park. The largest of these improvements is the new interchange at Twin Peaks Road/I-10, which would provide a direct connection to I-10 for residents in the northwestern area of Pima County (a link that is not available now). Because traffic models show that this new link would reduce non-visitor traffic on Picture Rocks Road, this would result in long-term moderate to major beneficial improvements for visitors, because of reductions in commuter traffic, and changes in the roadway environment (more recreational and less commuter-oriented behavior and patterns). Non-visitor users would also experience some long-term, moderate beneficial impacts in improved travel time and safety related to the use of transportation infrastructure designed to accommodate faster-moving and higher volume traffic than is reasonable on Picture Rocks Road.

Minor transportation improvements in the 2030 plan include: Ina Road (improved capacity), Sandario Road (paved shoulders provide increased safety), traffic-calming on Picture Rocks Road (presumably in conjunction with park efforts for safety improvements), and reconstruction of the scenic Bajada Loop Drive. Overall, these minor improvements designed to increase safety and provide congestion relief would provide visitors and non-visitors with long-term, minor beneficial impacts.

In addition to transportation plans, Pima County's *Comprehensive Plan Update 2001* and its policies also have an impact on transportation demand and circulation in the region, and their impact on the park (particularly the Tucson Mountain District). Western Pima County currently has very limited commercial and public services. The *2001 Comprehensive Plan Update* does not show land use patterns that would address or reverse this trend in the future. This means that the primary destination of residents for goods, services, and economic opportunities will continue to be to the east of the Tucson Mountains, in Tucson. The few east-west connector roads in this area are critical links in Pima County's transportation system and likely to continue to experience commuter travel patterns (highest use on weekdays during morning and evening commuter rush) and overall high demand.

With the annual growth rate in Pima County almost twice the national average, growth may continue to occur west of the Tucson Mountains before adequate transportation infrastructure needed to support it is in place. Limited east-west roadway connectivity, paired with rapid growth and a strong demand for services in Tucson would cause the demand on the existing east-west connector roadways (particularly Picture Rocks Road but also Kinney Road) to increase. The rise in demand will occur even with the *2030 Regional Transportation Plan* improvements for northwestern Pima County (DEA

for northwestern Pima County (DEA estimates that daily traffic on Picture Rocks Road would grow by 20%–30% by 2025, even with the Twin Peaks Road interchange). Picture Rocks Road and Kinney Road would also likely experience additional recreational traffic (typically on weekends) if visitation rises along with the regional growth rate.

Overall, alternative 1, in conjunction with the impact of other regional land use and transportation policies and actions described above, would have a long-term, moderate, adverse cumulative impact on visitors because of safety concerns and road congestion resulting from background regional growth and inadequate local transportation infrastructure to serve circulation demand. The impact of alternative 1 relative to the overall cumulative impact on transportation congestion and safety issues in northwestern Pima County from implementing alternative 1 would be small.

Conclusion. Congestion and safety problems on Picture Rocks Road could result in both visitors and non-visitors diverting to Twin Peaks and Kinney roads. Potential traffic diversion would have a long-term negligible beneficial effect for all users on Picture Rocks Road, Ina Road, and Wade Road, since these roads are nearing capacity. Long-term minor adverse effects to visitors and non-visitors would continue as a result of the confusing circulation pattern of the scenic Bajada Loop Drive.

A continuation of current conditions at the Picture Rocks Road/Golden Gate Road intersection under alternative 1 would result in a long-term, major adverse impact to safety of visitors and non-visitor users. Non-visitor users would experience long-term, minor, adverse impacts to safety from the park's management of Picture Rocks Road. Having a portion of the scenic Bajada Loop Drive on Sandario Road would result in a long-term, moderate to major adverse impacts on visitors and non-visitor users because of the high accident rate on this section of Sandario Road. Alternative 1 would result in long-term, minor adverse impacts to parking for visitors and non-visitor users.

Rincon Mountain District

Circulation. Circulation in the area adjacent to the park would remain as it is today. Cactus Forest Drive has sufficient capacity available for additional visitation. Access roads to the park (Speedway, Broadway, and Old Spanish Trail) have plenty of additional capacity, and all are operating at or above Level of Service (LOS) C. Additional traffic from modest increases in visitation or changes in visitation patterns may result in increased congestion at the park entrance, however this intersection currently operates at LOS A so there is room to accommodate additional visitation. As visitation rises, the area between the entrance station and Old Spanish Trail may experience a corresponding increase in congestion, since staff has already observed some traffic queuing in this area at peak times. As growth occurs in Tucson, Old Spanish Trail, Escalante Road, Freeman Road, Broadway Boulevard and Speedway Boulevard (the roads providing primary access to the park), and other regional roadways en route to the park would experience background increases in traffic levels that visitors would encounter en route to the park. This alternative would have long-term, negligible, adverse impacts on visitors, since the capacity exists to handle additional visitation and background growth with either existing facilities and/or minimal changes to park operations.

Safety. Park staff has observed occasional conflicts between periodic traffic queues at the entrance station and pedestrians crossing Cactus Forest Drive between the visitor center parking lot and the Rincon visitor center. This alternative would not modify that situation, so there would be a continuing long-term, negligible adverse effect on visitor safety.

Parking. Parking at the Douglas Spring trailhead, Wildhorse trailhead, Broadway trailhead, and the Rincon visitor center is at or beyond capacity. Without additional parking capacity, visitors may park outside parking boundaries, divert to other trailheads, or divert to other nearby recreation destinations with a better parking supply. With a modest increase in visitation, this alternative would result in long-term, minor adverse impacts on visitors due to a lack of parking.

Cumulative Impacts. Impacts from the fast pace of growth and the slower pace of transportation infrastructure construction in the Tucson area would have very little impact on this district, since it has no through roads and non-visitor users are not a factor. Traffic demand on roads adjacent to the park such as Broadway, Speedway, Freeman, and Old Spanish Trail, is not likely to rise substantially, since these roads terminate at or near the district's eastern and northern borders and service low density, rural development. There are no planned improvements shown in the *2030 Regional Transportation Plan* that would impact park access or roads (such as extensions) adjacent to the park. Transportation impacts from increased visitation resulting from regional growth would mostly be related to an increase in demand for parking and a turn lane at Old Spanish Trail to the visitor center and parking at trailheads. Parking in this district is already beyond capacity in most areas. Impacts of park visitation on regional roadways would be very small, as the road network in this area has many east-west and north-south options and any increases in visitation could be effectively spread out over the network, decreasing the possibility of congestion and safety concerns. Overall, impacts of alternative 1, in conjunction with the impacts of other plans and actions described above, would result in minor adverse cumulative impacts to transportation. Alternative 1 would contribute a relatively small increment relative to the overall cumulative impact.

Conclusion. Alternative 1 would have long-term, negligible, adverse impacts on visitors, since the capacity exists to handle additional visitation and background growth with existing facilities and/or minimal changes to park operations. There would be a continuing long-term negligible adverse impact on visitor safety from occasional conflicts between pedestrians and traffic queues. Long-term, minor adverse impacts are anticipated due to a lack of parking.

PARK OPERATIONS

Public Facilities

Trails and Trailheads. Until the ongoing trails plan is completed, no new trails or trailheads would be developed. The *Cactus Forest Trail Environmental Assessment* and the *Tucson Mountain District Trail Plan* would continue to provide formal guidance for trails management in the park. These plans do not address certain areas in the park that are adversely impacted by intensive trail use. User group conflicts on trails and at trailheads, trail maintenance, and duplicate and parallel trails and associated resource damage would continue under this alternative. Park staff would continually approach problems with short-term, partial remedies to ongoing trails problems not covered by existing plans.

The overall poor condition of the trails requires a level of staff time and effort not budgeted under this alternative to make repairs and manage multiple uses. Inadequate trail maintenance would continue, creating further problems for park operations in the long term. Because alternative 1 would continue current management strategies, the effects on park operations regarding trail and trailhead management and maintenance would be moderately adverse, both in the short term and long term.

Park Roads and Entrance Stations. No changes to park roads or entrance stations would occur under this alternative. Current

conditions on Picture Rocks Road and Sandario roads would continue and would require intensive staff time to patrol and enforce regulations due to congestion and vehicles exceeding parkwide speed limits. Continuing existing conditions would also require many emergency responses by park rangers to automobile-related accidents and violations along these roads. Implementing this alternative would continue to cause a long term major adverse effect on park operations. Aside from law enforcement patrols and traffic stops, there is very little staff presence on this road and no practical means to verify that park road users on Picture Rocks Road have paid required entrance fees.

Golden Gate Road is in poor condition as a result of roadway design and multiple years of deferred maintenance. Under alternative 1, this unpaved road would remain open as a park road, requiring staff time and routine and backlogged maintenance and would continue a long-term moderate adverse effect on park operations.

Parking Areas. Long-term moderate adverse effects due to the staff time required to address visitor use conflicts and resource impacts associated with insufficient parking would continue. Reliance on informal parking, inadequate design of parking facilities, and insufficient area available for parking would continue to result in traffic jams, user conflicts, and resource impacts. These impacts would continue to pull staff from other projects and duties as a result of the need to manage traffic, enforce appropriate visitor use, and repair damaged resources.

Visitor and Education Centers. Under alternative 1, the Rincon Mountain District visitor center would continue to operate as it does currently, creating a long term major adverse effect on park operations. This building is undersized and inadequate for current visitation. The building's electrical and mechanical systems are outdated and insufficient for current use. The primary function of this building is for visitor services related to resource education and interpretation, yet half of this building is occupied by park offices that serve other operational functions. Mechanical breakdowns are frequent because of the outdated mechanical and electrical systems, the increased dependence on computers, and the need to keep the office space and visitor space cool in the hot summers. Breakdowns disrupt the day to day operations of the visitor facility and offices. The mix of incompatible uses creates operational inefficiency. Because of the outdated building systems, ongoing maintenance is a serious problem adding considerably to the backlogged maintenance list for the park.

Orientation, Wayside Exhibits, and Interior Exhibits. There would be no changes to orientation and wayside exhibits. Because interior exhibits in the Rincon Mountain visitor center are outdated and several locations throughout the park lack adequate wayside exhibits and signs for park visitors, long-term, minor adverse impacts on park staff would continue due to the time required to supplement inadequate information provided to park visitors.

Camping. No additional camping would be developed under this alternative. Camping would continue to be monitored by backcountry rangers, resulting in an ongoing negligible long-term adverse impact on park operations from use of staff time.

Administrative Facilities

Offices, Storage, and Park Buildings. There would be no changes to current office, storage, and park buildings under this alternative. Office space would remain insufficient. This deficiency would continue to have a long-term, moderate adverse effect on efficiencies and activities of park operations. Effects on park storage facilities would be negligible under this alternative.

Corrals. The corral at Madrona would remain closed and would be removed under this alternative as funding became available. Removal of this facility would create short-term, minor adverse impacts on park operations, including commitment of staff time during deconstruction. The loss of this facility for pack stock operations to support trails and fire service in this district would create a long-term moderate adverse impact.

Park Housing. Park housing at Madrona would remain closed, and as funding becomes available this building would be removed as a result of a public health service recommendation to discontinue use. No replacement building would be constructed. The presence of NPS staff at the Madrona ranger station has been a component of park operations for this area. Because of proposed development outside park boundaries adjacent to Madrona, coupled with already increasing visitor use at this site, park staff would continue to be required to patrol and monitor this location. Because of the increased demands on park operations at this site, the absence of a facility at this location would constitute a long term minor adverse effect on park operations. The removal of this building would constitute a short-term minor adverse effect on park operations during deconstruction. The permanent removal of this building and the curtailing of associated upkeep and maintenance would create a moderate beneficial effect on park operations over the long term.

Other Buildings. The Manning Camp area would continue to be used for fire crew and other activities. The area has been heavily developed to support administrative use and requires intensive support due to the remote, wilderness location of this area. Modern additions and infrastructure would continue to require ongoing maintenance to support administrative activities. The use of Manning Camp for seasonal fire and other park activities would continue to be a moderate adverse effect on park operations over the long term due to the extensive maintenance required.

The Civilian Aeronautical Administration building in the Rincon Mountain District serves no park use. Federal historic preservation laws require ongoing maintenance to stabilize and preserve it. Ongoing maintenance would continue to create a long term minor adverse effect on park operations.

Cumulative Impacts

Alternative 1 continues the existing condition or current management practice. As currently structured and staffed, the park is at capacity regarding effective visitor services and performance of required duties to manage Saguaro National Park as legislated by Congress.

Outside of park boundaries, all general and comprehensive plans for surrounding communities recognize that substantial future population growth will occur in this region. The *Sonoran Desert Conservation Plan* documents an exponential increase in land developed and occupied by the city of Tucson over the past century and anticipates a continuation of this trend into the next two decades, doubling the current area occupied by the city. Marana and Oro Valley were the first and second fastest growing communities respectively in Arizona during the 1990s. General plans for Tucson, Marana, and Oro Valley all document and address expected and projected future population increases. Tucson Mountains, Catalina Foothills and Rincon/ Southeast subregional plans all anticipate and plan for an increase in population in these areas¸ which are areas that directly adjoin Saguaro National Park. The *Pima County Comprehensive Plan* identifies a total net increase in land that will be rezoned for higher density as a result of anticipated population growth in the eastern part of this county.

Regardless of methods employed by these plans to manage population growth increases in the region that surrounds Saguaro National Park, the one consistent factor in all plans is the expected increase in regional development to accommodate an expanding population. There is a direct correlation between park visitation and regional population, and as fewer and fewer open spaces are available for a growing population to recreate or experience an undeveloped natural setting in the Upper Sonoran Desert, land in Saguaro National Park would become increasingly valuable for these opportunities. Additionally, as adjacent private land is developed for residential use, management of park borders will require careful attention by park staff to manage desired conditions for park resources and visitor opportunities.

An increase in unregulated social trails into and within park boundaries is expected to occur as a result of new development on adjacent private lands and would require additional staff time to correct, repair, and manage associated adverse effects. The occurrence of invasive exotic plants in the park is expected to increase as new development on adjacent lands would inevitably introduce exotic, invasive, ornamental species, which would also require additional park staff time to manage and control the associated adverse effects

Impermeable hardened surfaces, buildings, and constructed barriers associated with development all influence and impact the natural migration of native species and would further create habitat fragmentation in the greater Tucson region. Park staff would be required to manage adverse effects. The incremental impacts of development on cultural resources within the park would continue to require park staff time and effort to enforce, monitor and correct adverse effects.

An increase in highly flammable, nonnative plants on private property adjacent to park wilderness lands creates an incompatible and complex situation for wildfire management between these two types of land uses. A major fire could severely impact park operations as a result of necessary wildfire suppression required to protect adjacent private property.

The expected increase in visitation to Saguaro National Park and increasing development on adjacent private lands would require greater staff intervention to provide adequate visitor services and to address associated resource impacts. Because this alternative would continue the existing condition or current management practices, the above-mentioned actions, in combination with actions proposed under this alternative, would result in moderate long-term adverse cumulative impacts on park operations due to the increased management requirements necessary to address these issues. Alternative 1's contribution to these impacts would be modest.

Conclusion

Continuing the current trend in park staffing would likely result in an increasing inability to effectively meet demands on park operations due to steadily increasing visitation and traffic associated with non-visitors. This continued direction would create a long-term moderate adverse effect on park operations.

Current law enforcement requirements to manage traffic along Picture Rocks Road and maintaining the Rincon Mountain District visitor center would create long-term major adverse impacts on park operations.

Actions in alternative 1 that would create long-term moderate adverse impacts on park operations and facilities include continuing current management practices regarding trails and trailheads, parking areas, maintenance of the Golden Gate Road, the continuation of inadequate office space for park staff, the removal of the corral at Madrona, and

monitoring the CAA building and stabilizing Manning Cabin.

Outdated exhibits and lack of adequate information signs, and the removal of condemned park housing at Madrona with no replacement would create minor long-term adverse effects on park operations as a result of increased personal services required for visitors by park staff.

Other actions, combined with the actions proposed in alternative 1, would create moderate adverse cumulative impacts on park operations. Alternative 1's contribution to these impacts would be modest.

UNAVOIDABLE ADVERSE IMPACTS

The following paragraphs describe the more important (moderate and major intensity) adverse impacts that would result from implementing this alternative. These are residual impacts that would remain after mitigation was implemented. The negligible and minor impacts are described in the foregoing analysis.

Under all alternatives, proposed actions would strictly avoid known archeological sites. Any such sites that could not be avoided because of ground-disturbing activity would be mitigated in concurrence with the Arizona state historic preservation officer. Mitigation such as data recovery would constitute an unavoidable adverse impact on the archeological sites involved.
Alternative 1 actions would affect steadily increasing traffic volumes on through-park roads over the long term, with a possible short-term reduction with the opening of the proposed Twin Peaks interchange. Traffic congestion and speeding along through-park roads would continue to adversely impact visitor experiences by reducing visitor access opportunities and creating both real and perceived safety conflicts. These adverse impacts would also directly effect park operations due to the increased demand on staff to address these issues. The continued need to maintain the Golden Gate Road would also adversely impact park operations.

Moderate adverse impacts on the visitor experience from user conflicts at trailheads, limited bicycling opportunities, and limited regional trail connections would continue in this alternative. Trailhead conflicts would also necessitate continued intervention by park staff to address conflicts between user groups. Additionally, trails, trailhead facilities, and resources that are impacted at these sites would continue to require staff time for maintenance and restoration as a result of current design and layout. The continued loss of corral facilities would adversely impact park staff engaged in trail maintenance and other activities within the Rincon Mountain District.

Moderate adverse impacts on interpretation and education opportunities would continue as a result of crowded conditions and outdated exhibits at the Rincon Mountain District visitor center. Park operations would also continue to be impacted as a result of inadequate visitor center facilities, both as a result of required intervention to manage users and due to conflicting uses within this facility.

Inadequate park offices would also continue to adversely impact park operations under this alternative. Manning Camp would continue to adversely impact park operations as a result of the intensive support required to maintain operations at this facility under this alternative.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The irretrievable and irreversible commitments of resources that are associated with this alternative are summarized below. Irreversible commitments are those that

cannot be reversed, except perhaps in the extreme long term (e.g., the regrowth of an old-growth forest). Irretrievable commitments are those that are lost for a period of time (e.g., if a road is constructed, the vegetative productivity is lost for as long as the road remains).

For cultural resources under any of the alternatives, although not anticipated, the mitigation of any archeological sites would constitute an irreversible and irretrievable commitment of resources. Mitigation such as data recovery would change the status of archeological artifacts and other archeological information and data from in situ preservation for the future to current extraction via excavation. It is possible that some information might be lost in the process because future excavation methods could improve, thereby potentially yielding more information than current methods provide.

RELATIONSHIPS BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Most of the park would remain protected in a natural state and would maintain its long-term productivity under alternative 1. Current short-term uses of the environment such as visitor use and park management would continue. Disturbances to natural resources from these activities may reduce long-term productivity in localized areas in the short term. However, these effects would be far outweighed by maintenance of the long-term productivity of the park as a whole.

IMPACTS OF IMPLEMENTING ALTERNATIVE 2 (PREFERRED ALTERNATIVE)

NATURAL RESOURCES

The management zones promote the alternative's emphasis of protecting natural resources. This alternative has the highest percentage of primitive and semi-primitive zones. These zones restrict the level of development and recommend lower levels of visitation to maintain pristine and excellent natural resource conditions. The natural zone allows for the potential of the most types of uses, such as higher trail densities, paved trails, bicycling, and stock use, which might result in greater adverse impacts on vegetation than the primitive or semi-primitive zones. The natural zone is located in limited areas in this alternative. The combination of zones in this alternative should provide the greatest overall protection for the park's vegetation.

Vegetation

Analysis. Vegetation would be lost or altered in local areas under alternative 2, primarily from the development or improvement of facilities and visitor services. Most new developments or improvements would be in the footprint of disturbed areas where the vegetation already has been altered; therefore, little additional loss of native vegetation would result from construction or improvements of trailheads, the Rincon Mountain District visitor center and parking area, Picture Rocks Road, staff offices, and employee housing. Given the previous vegetation disturbance in most of these areas, and with the use of appropriate mitigative measures to minimize additional impacts (such as ensuring that equipment stays within project area boundaries, revegetating disturbed areas, and taking steps to avoid the spread of exotic species), the long-term adverse effects on native vegetation from these actions would be minor.

The installation of traffic-calming devices (adaptive management) could result in short-term adverse impacts on vegetation. The devices could include curb and guttering, roundabouts, park entrance features, and road signs. The equipment needed to install the devices would need to be staged near the road. If the staging area was on an unimproved surface, vegetation would be trampled and crushed. Mitigative measures would include placing equipment in previously disturbed areas and revegetation of the sites. The installation would have short-term negligible adverse impacts. The long-term impacts would be minor and beneficial due to the restriction of informal pull-off locations (because of curbs and gutters) and slower speeds, which would allow for better handling of vehicles on the road and less roadside vegetation damage.

Several indirect impacts also could result from the installation of traffic-calming devices. If erosion along the road increased because of the installation of these devices, more vegetation would be lost. Nonnative plants could be introduced or spread into areas that are disturbed during installation. If visitors parked on the side of the road, some roadside plants might be crushed, trampled, or picked. Roadside vegetation might also be inadvertently trimmed or removed during routine maintenance of the traffic-calming devices. Mitigative measures such as improved drainage, adding formal pull-off areas, and revegetation of disturbed areas would minimize the potential for vegetation loss. Depending on the location and design of traffic-calming devices, the indirect long-term adverse effects on native vegetation would be negligible.

If the park's desired conditions for visitor experience and/or biological protection still were not met, then the next level of traffic-calming would be implemented. This could

consist of installing speed bumps, fee kiosks/entrance stations, or a combination of the two. Slowing traffic more would further improve habitat conditions on through-park roads by decreasing the risk of vegetation damage due to accidents and ensuring that visitors have an improved chance of stopping at formal pull-outs instead of creating their own.

If this still does not enable the park to meet their goals, the final step in the process would be to work with Pima County to develop alternative routes around the park. This would be beneficial to vegetation in the park.

Constructing the new segment of the scenic Bajada Loop Drive in the Tucson Mountain District would cause the loss and alteration of native desert vegetation. Some native plants would be lost permanently because of the road footprint. Even with mitigative measures, construction equipment in the project area would damage or cause the loss of some vegetation. Short-term minor adverse impacts on vegetation would occur due to construction activities. Mitigation would include revegetation of work areas. Several indirect impacts also could result from constructing the road segment, including the introduction and spread of nonnative plants. If visitors created "informal" pulloffs on this new segment by parking off the roadside, some plants might be crushed, trampled, or picked. Road maintenance also might indirectly affect roadside vegetation. Because the new segment would be paved, the vegetation would not be disturbed by the grading done for gravel roads. Depending on the road's location and design, localized long-term adverse effects on native vegetation from the new road segment would be minor.

The Rincon Mountain District visitor center and parking lot expansion would occur in the area between the visitor center and headquarters, in an area that is somewhat disturbed. The reconstruction of the employee housing at Madrona would be in an area that has been previously disturbed. The new corrals would be sited in an undisturbed area that would minimize impacts on vegetation. Short-term minor adverse impacts on vegetation would occur due to construction activities. Mitigation would include revegetation of work areas. Despite the use of mitigative measures to help reduce the loss of desert vegetation, some vegetation would be permanently disturbed or lost, resulting in a long-term, negligible, adverse impact.

Vegetation also would be altered or lost through visitation in alternative 2. As in alternative 1, people walking over and trampling plants in and around existing facilities would result in the loss of native vegetation, a long-term negligible adverse effect.

Building or designating new trails or realigning existing trails and routes would cause both beneficial and adverse consequences for the park's vegetation. New trails and routes in the expansion areas would result in the trampling and loss of more vegetation than currently occurs. Increased erosion in any of these areas from loss of vegetative cover may cause the loss of additional plants, and the potential for visitors or stock animals to inadvertently carry in and spread exotic species also would increase. Trails would be designed and located in areas where risk of erosion could be mitigated. Depending on the level of use, time of use, and the vegetation, there could be a negligible long-term adverse impact on vegetation in these local areas.

The park would revegetate social trails as part of their trails management activities. Restoring the habitat in these areas would have a long-term minor beneficial impact on vegetation.

An increase in the number of temporary spike camps for fire and trail crews would result in an increase in the amount of vegetation trampled and crushed under feet, tents, and other equipment. Mitigative measures would be implemented to site camps away from

locations with sensitive plants, and camps would minimize how often they reuse the same area. Short-term minor adverse impacts on vegetation would occur.

Reduction in the use of facilities at Manning Camp would have a beneficial impact on native vegetation. Reducing the footprint for administrative activities would allow native vegetation to return to previously disturbed areas. This would result in a long-term minor beneficial impact on vegetation.

Restricting use to designated trails below 4,500 feet elevation would help to reduce "social" trails and focus use. This would cause a long-term moderate beneficial effect on native vegetation.

The conversion of Golden Gate Road to a trail would reduce impacts on vegetation due to the elimination of vehicles, revegetation efforts to narrow the corridor, and drainage improvements. This would result in a long-term moderate beneficial impact on vegetation.

Adding waysides and interpretive trails would benefit park vegetation by improving visitors' education. Their appreciation of native and rare plants would be increased, and adverse effects on vegetation might be reduced. Another potential beneficial effect of such education could be that visitors would learn to help avoid the spread of exotic species in the park. The regular presence of staff at Madrona would help minimize the impacts on vegetation by visitors. Overall, the long-term beneficial effect on park vegetation from these actions would be minor.

Surveys for rare plants would be conducted before developments were constructed in alternative 2, and in most cases developments (improvements to trailheads, roads, and visitor facilities) could be sited to avoid effects on these populations. Overall, alternative 2 would have short-term moderate adverse impacts and long-term minor adverse impacts on vegetation from development and road and trail improvements.

Cumulative Effects. The recent rehabilitation of Cactus Forest Loop Drive had negligible short-term and long-term beneficial impacts on vegetation.

Outside the park, development in the Houghton area, Rincon/Southeast Subregional area, and Tucson Mountain Subregional area surrounding the park would continue to alter the types and distribution of vegetation. The areas have been zoned to protect habitat while allowing for growth and expansion of Tucson. The long-term adverse impacts on vegetation from development would be moderate.

The Cienega Conservation Corridor is being managed by a partnership composed of private, nonprofit, and governmental partners. Potentially connecting to the Las Cienegas National Conservation Area would allow this riparian corridor to continue with traditional recreational and ranching uses, which would have a long-term beneficial effect on vegetation. The corridor would protect an area south of the Rincon Mountain District and Coronado National Forest to the Las Cienegas National Conservation Area. This would have a long-term moderate beneficial impact on vegetation in the region.

The creation of the Ironwood Forest National Monument west of Tucson increased the level of protection on approximately 190,000 acres, of which almost 130,000 acres is federal property. This action, added to the effects of increasing educational and interpretive efforts in the national monument, has resulted in better protection of native vegetation. The creation of this area would continue to have a long-term moderate beneficial impact on vegetation in the region.

Overall, when all the effects of actions in and outside the park were added to the effects from alternative 2, the long-term adverse

cumulative effects on vegetation in the area would be minor. The beneficial impacts of several projects outside the park offset some of the adverse impacts from other outside projects. The contribution of alternative 2 to the cumulative impacts would be relatively small.

Conclusion. This alternative would have more potential for both beneficial and adverse effects in more areas of the park than alternative 1. The loss of native vegetation would be reduced by better protection and revegetation of disturbed areas. Alternative 2 would likely have a short-term moderate and a long-term minor adverse impact in localized areas. Overall, most native vegetation in Saguaro National Park would continue to be protected and self-sustaining under alternative 2.

The long-term cumulative effects on vegetation from this alternative and other actions in and outside the park would be minor and adverse. The contribution of alternative 2 to cumulative impacts would be relatively small. The levels of these effects would not be sufficient to constitute an impairment of park resources or values.

Wildlife

The management zones promote the alternative's emphasis of protecting natural resources. This alternative has the highest percentage of primitive and semi-primitive zones. These zones restrict the level of development and recommend lower levels of visitation to maintain pristine and excellent natural resource conditions. The natural zone allows for the potential of the most types of uses, such as higher trail densities, paved trails, bicycling, and stock use, which might result in greater adverse impacts on wildlife than the primitive or semi-primitive zones. The natural zone is located in limited areas in this alternative. The combination of zones in this alternative should provide the greatest overall protection to wildlife in the park.

Analysis. New developments, improved access, and increased visitation to parts of the park would be the primary actions affecting wildlife and their habitat under alternative 2. Although a number of improvements would be made to existing facilities, most would be done in already disturbed areas: Picture Rocks Road improvements, Golden Gate Road conversion to a trail, trailhead improvements, Rincon Mountain District visitor center expansion, improvements to staff offices, and reconstruction of employee housing. Wildlife populations and their habitats have been altered by past human actions in these areas, and no additional habitat would be lost. Increased noise and human activity due to construction could temporarily displace some animals such as rodents, reptiles, and birds, resulting in minor short-term adverse impacts on wildlife populations in local areas. Increased visitation due to improved visitor facilities in a few areas could adversely affect some wildlife as a result of habitat quality, potentially causing displacement of some species, but any disturbance would be intermittent and the effect would be negligible.

The installation of traffic-calming devices would have temporary, short-term adverse impacts on wildlife. Noise from construction equipment and people would displace some wildlife. Most birds, mammals, rodents, and reptiles would avoid the area during the construction period, but many would return after construction ceased. Some animals, primarily invertebrates, would be unable to move out of the construction area and would be killed. The short-term adverse impacts would be minor.

The traffic-calming devices would also have indirect impacts on wildlife. The reduced vehicle speeds should allow wildlife more time to cross the road and reduce the number hit by vehicles and injured or killed along

through-park roads, resulting in beneficial impacts. Maintenance of the traffic-calming devices and the road also could disturb wildlife. The extent of the effects would depend partly on the location and nature of the maintenance activities. With careful design of the traffic-calming strategies/devices there would be a long-term moderate beneficial indirect effect on area wildlife.

If the park must use the next level of traffic calming strategies to meet the park's desired conditions for visitor experience and/or biological protection (installing speed bumps, fee kiosks, or a combination of the two), additional compliance would be undertaken. Slowing traffic more would further improve wildlife habitat conditions on through-park roads by decreasing the risk of wildlife being hit by vehicles.

If this still does not enable to the park to meet their goals, the final step would be to work with Pima County to develop alternative routes around the park. It would be beneficial to wildlife in the park by reducing a contributor to habitat fragmentation.

Building the new one-lane segment of the scenic paved Bajada Loop Drive would cause the permanent loss of a small portion of Sonoran desert habitat and displace wildlife. Clearing vegetation in that area would result in the loss of forage and cover. Disturbed areas that are not part of the new segment would be revegetated to minimize long-term impacts on wildlife habitat. Also, removing one lane of the existing two-lane section of the Bajada Loop Drive would restore desert wildlife habitat. Noise from construction equipment and future vehicles on the road could disturb wildlife, causing them to avoid the area. The new segment of road would be near Sandario Road. Most wildlife that are sensitive to traffic already avoid the area. Many desert animals are nocturnal, and the scenic Bajada Loop Drive would continue to be closed at night, which would reduce the risk of road kills. However, some animals would be active during daylight hours. Slower speed limits and signs typically associated with a park road would help reduce the potential for wildlife to be hit by vehicles, but even with these measures there could be some road kills. This would result in a short-term moderate and a long-term minor adverse impact on wildlife.

The Rincon Mountain District visitor center and parking lot expansion would occur between the visitor center and the headquarters in an area that has been somewhat disturbed, causing the permanent loss of some habitat. This loss would primarily affect smaller, less mobile wildlife species and species with smaller home ranges, such as invertebrates. Some reptiles, small mammals, rodents, and birds also could be displaced. Most species sensitive to human activity already avoid the area. The loss of habitat and some animals would result in a long-term minor adverse effect on animals near this facility.

Visitation to parts of the park probably would be increased by improved access from improving trailheads throughout the park and developing new trails and trailheads. In turn, habitat fragmentation due to trails would increase over current levels because of more visitor use of new trails and routes. Habitat fragmentation would affect movement corridors of some wildlife, such as mountain lions. However, the width of trails is generally no more than a few feet with intermittent presence of people so the level of fragmentation would be small, thus resulting in a long-term negligible adverse effect. Some wildlife sensitive to the presence of people might be displaced from areas around these corridors during the peak high use season. These actions would result in a minor short-term and long-term adverse impact on wildlife populations in local areas, depending on such factors as the level, duration, and type of visitor use; the season of use; and the wildlife species.

Conversion of Golden Gate Road to a trail would reduce habitat fragmentation and improve the protection of wildlife populations and habitats. It would be easier and safer for wildlife to cross without the risk of being killed. A narrower, less traveled corridor would encourage wildlife sensitive to human presence to use the area more. Conversion would result in a long-term, moderate beneficial impact on wildlife.

As with vegetation, increased educational and interpretive efforts under alternative 2 would generally benefit wildlife. The addition of waysides and interpretive trails would help educate visitors, increasing their appreciation of the park's wildlife and minimizing impacts from actions such as feeding wildlife. The long-term beneficial effect on the park's wildlife would be minor.

Overall, the adverse effects of alternative 2 on wildlife would be moderate in the short term and minor over the long term.

Cumulative Effects. The recent rehabilitation of Cactus Forest Loop Drive had a negligible long-term adverse impact on wildlife.

Outside the park, development in the Houghton area, Rincon/Southeast Subregional area, and Tucson Mountain Subregional area surrounding the park would continue to alter the types and distribution of habitat available to wildlife. The areas have been zoned to protect essential habitat while allowing for growth and expansion of Tucson. An increase in the number of structures and people in the currently undeveloped areas would reduce the amount of habitat available. Some wildlife would be displaced such as small mammals, rodents, reptiles, and birds by the expansion of residential and commercial developments. Development within the Cienega Conservation Corridor would have the largest impact on wildlife; this is a key biological movement corridor for large mammals because it connects the Rincon Mountains with the Santa Rita and Empire Mountains. The long-term adverse impacts would be moderate.

The Cienega Conservation Corridor is being managed by a partnership composed of private, nonprofit, and governmental partners. Potentially connecting to the Las Cienegas National Conservation Area would allow this riparian corridor to continue with traditional recreational and ranching uses, which would continue to protect the area. This addition would have a long-term beneficial effect on wildlife. Increasing protection of this biological corridor would allow easier movement of wildlife between mountain ranges.

The creation of the Ironwood Forest National Monument west of Tucson increased the level of protection on approximately 190,000 acres of land, of which almost 130,000 acres is federal property. This would continue to have a long-term moderate beneficial impact on wildlife in the region.

Overall, when the effects of alternative 2 were added to other actions within and outside the park, there would be moderate long-term adverse cumulative impacts on area wildlife populations. Alternative 2's portion of this impact would be relatively small.

Conclusion. Most wildlife populations and habitats in Saguaro National Park would continue to be protected and would not be changed by the actions proposed in this alternative. No actions would substantially affect areas that are known to be important for breeding, nesting, or foraging, or that are key migration routes. The proposals in alternative 2 would result in short-term moderate and long-term minor adverse effects on wildlife populations and habitats.

The cumulative effects of alternative 2 added to other actions outside the park on area wildlife and their habitat would include increased habitat fragmentation and wildlife displacement resulting in a long-term

moderate adverse effect. Alternative 2's portion of this impact would be relatively small. These impacts would not constitute an impairment of park resources or values.

Threatened and Endangered Species and Species of Concern

The management zones promote the alternative's emphasis of protecting natural resources. This alternative has the highest percentage of primitive and semi-primitive zones. These zones restrict the level of development and recommend lower levels of visitation to maintain pristine and excellent natural resource conditions. The natural zone allows for the potential of the most types of uses, such as higher trail densities, paved trails, bicycling, and stock use, which might result in greater adverse impacts to protected species than the primitive or semi-primitive zones. The natural zone is located in limited areas in this alternative. The combination of zones in this alternative should provide the greatest overall protection to threatened and endangered species in the park.

Analysis. No proposed actions in alternative 2 would be in areas known to contain lesser long-nosed bat, Mexican spotted owl, yellow-billed cuckoo, or cactus ferruginous pygmy-owl populations. Most areas where visitation might increase because of new or improved trailheads, trails, or visitor center expansion would not be in areas known to be frequented by these populations.

Alternative 2 would not be likely to adversely affect lesser long-nosed bat, Mexican spotted owl, yellow-billed cuckoo, or cactus ferruginous pygmy-owl habitat in the area. Facilities that would be developed in the Tucson Mountain District and the lower elevations of the Rincon Mountain District would be in or near potential cactus ferruginous pygmy-owl and lesser long-nosed bat habitat, but the facilities and people in these areas would not necessarily keep cactus ferruginous pygmy-owls and lesser long-nosed bats from dispersing into and using the areas. The cactus ferruginous pygmy-owl is active mostly during daylight hours. The presence of people could discourage nesting and feeding activities in high use areas. However, cactus ferruginous pygmy-owls have not been confirmed to be in the park since 1995. The chance of encounters with people or disturbance due to human activity is low because off trail travel is prohibited below 4,500 feet and the owls have a maximum elevation range of 4, 000 feet. Optimal habitat is abundant in the park, and the small amount that would be disturbed due to facility improvements or visitation would leave the owls plenty of acreage to nest and feed with minimal disturbance. The bats, which are mostly nocturnal, would be in the areas when few people were present.

The reduction in use of Manning Camp proposed for alternative 2 would be in or near Mexican spotted owl habitat. This would be a negligible beneficial effect, improving Mexican spotted owl by having less personnel, equipment, and activity in the area.

Yellow-billed cuckoo habitat is primarily riparian areas. The presence of a ranger living at Madrona would provide a beneficial effect by providing interpretation and information on resource protection. The continued protection of the Madrona and Rincon Creek area with low visitation levels would continue to provide habitat for transient and breeding cuckoos.

Cumulative Effects. Although residential and commercial development would continue to reduce cactus ferruginous pygmy-owl, yellow-billed cuckoo, and lesser long-nosed bat habitat, independent of alternative 2, it is unlikely that such efforts would be permitted in areas where they are known to occur.

Pima County has a habitat conservation plan, known as the *Sonoran Desert Conservation Plan,* to guide development and protect key

habitats. Assuming future developments follow this approved habitat conservation plan, effects on threatened and endangered species should be minimized. However, if the zoning is changed so that it no longer follows the conservation plan recommendations, the long-term impacts would be adverse and major.

The Cienega Conservation Corridor is being managed by a partnership composed of private, nonprofit, and governmental partners. Potentially connecting to the Las Cienegas National Conservation Area, the corridor would allow this riparian corridor to continue with traditional recreational and ranching uses. This would have a long-term beneficial effect on special status species. Maintaining the biological corridor connecting the mountain ranges would ensure that a variety of riparian and desert habitats remain available.

The Gila topminnow is proposed to be reintroduced to the park by the U.S. Fish and Wildlife Service when habitat conditions support reintroduction. This would have a potential beneficial effect on the topminnow populations if efforts were successful.

Overall, the impacts of other actions described above, in combination with the impacts of alternative 2, would cumulatively affect but not likely adversely affect the lesser long-nosed bat, cactus ferruginous pygmy-owl, Mexican spotted owl, yellow-billed cuckoo, or Gila topminnow. Alternative 2's contribution to these cumulative effects would be relatively small.

Conclusion. Before taking any action in alternative 2 that might affect federally listed species in the park, the National Park Service would consult with the U.S. Fish and Wildlife Service to ensure that potential impacts were identified and avoided. There is habitat for the cactus ferruginous pygmy-owl in the park. However, actions proposed in alternative 2 would not be likely to adversely affect the populations of lesser long-nosed bat, Mexican spotted owl, yellow-billed cuckoo, Gila topminnow, or the cactus ferruginous pygmy-owl in Saguaro National Park.

Alternative 2 plus other actions may affect but would not be likely to cumulatively adversely affect the Mexican spotted owl, the yellow-billed cuckoos, Gila topminnow, lesser long-nosed bats, and cactus ferruginous pygmy-owl. Alternative 2's contribution to these cumulative effects would be relatively small. No impairment of park resources or values would result from this the alternative.

Soils/Geologic Resources

The management zones promote the alternative's emphasis of protecting natural resources. This alternative has the highest percentage of primitive and semi-primitive zones. These zones restrict the level of development and recommend lower levels of visitation to maintain pristine and excellent natural resource conditions. The natural zone allows for the potential of the most types of uses, such as higher trail densities, paved trails, bicycling, and stock use, which potentially may result in greater adverse impacts on soils than the primitive or semi-primitive zones. Higher levels of development are also allowed in the natural zone, which can lead to increased impacts on soils due to compaction and erosion. The natural zone is located in limited areas in this alternative. The combination of zones in this alternative should provide the greatest overall protection to soils in the park.

Analysis. The conversion of Golden Gate Road to a trail in alternative 2 would affect the park's soils. Depending on the design of the new trail, some parts of the former road may have to be graded to improve drainage and reduce erosion as part of the trail conversion, resulting in a long-term minor beneficial effect.

The installation of traffic-calming devices could result in short-term adverse impacts on soils during construction. The devices could include curb and guttering, roundabouts, and road signs. The equipment needed to install the devices would need to be placed near the road. If the staging area was on an unimproved surface, the equipment could increase soil compaction and erosion. Mitigative measures would include placing equipment in previously disturbed areas. The installation of traffic-calming devices would have short-term, negligible adverse impacts on soils.

Constructing the new segment of the scenic Bajada Loop Drive would result in soils being permanently disturbed or lost, a long-term moderate adverse effect. The road would be a paved, one-way, one-lane road, which would minimize the width of the road and the amount of soil impacted. Mitigative measures would be used to minimize erosion during construction. The road would be designed to minimize erosion from runoff over the life of the road. The new loop road segment construction would result in a long-term minor adverse impact on soils. Because the road would be paved, there would be less potential for erosion. (Gravel roads require regular grading, which keeps the soil on the road and along the shoulders loose and thus more easily moved by wind and water.) The paved road would create a barrier between the soil and the elements, thus reducing the amount of erodible soil. A new paved road segment would have a long-term minor beneficial impact on soils.

Trail realignments would have an overall beneficial impact on soils because the new alignments would be located in areas with soil qualities that would minimize erosion potential. This would result in a long-term minor beneficial impact. However, soil compaction due to foot and/or stock traffic might increase in previously undisturbed areas where the realignments are located. The realigned trails would be located where soil compaction is minimized; thus a long-term negligible adverse impact would occur. The trails that were abandoned as part of the realignment would be restored. This would have a long-term minor beneficial effect on soils due to decreased erosion from the plants holding the soil and decreased compaction from the plant roots. Overall, trail realignments should have a long-term minor beneficial impact on park soils.

The creation of new trails would result in new disturbance to soils and the potential for increased erosion. Mitigative measures would include locating trails on soils with low erosion hazards, small changes in slope, and proper signs to minimize social trails.

Trailhead improvements could result in a permanent loss and disturbance of soils if associated parking areas are built or expanded, and even with mitigative measures, some soil would be lost to erosion. If people parked their vehicles along the side of the road, it could cause a secondary adverse effect on soils through compaction and increased erosion due to vegetation loss. This could result in a minor long-term adverse impact on soils near improved trailheads.

The Rincon Mountain District visitor center and parking area expansion would have adverse impacts on soils. Construction would increase the amount of impervious area in the park, resulting in increased potential for erosion around the parking lot and visitor center during rain storms that create runoff. Mitigative measures such as proper drainage and designing the parking area to be a retention area would reduce the impacts. With mitigative measures, the long-term adverse impacts would be minor.

The soils in Saguaro National Park also would be adversely affected by several other actions in alternative 2. Park soils would be affected by constructing or improving park facilities, including reconstruction of the house at Madrona, improving staff offices, and the

conversion of housing to office space. These developments would be in areas where the soils have been altered by past activities. Although some soils in these areas could be altered and erosion increased by construction, with mitigation such as barriers preventing runoff and watering to reduce wind erosion, the adverse effects on soils would be short term, minor, and localized.

Increased visitation could have an adverse impact on soils. Larger numbers of people on park trails could increase soil compaction and the rate of erosion. Properly locating new trails, limiting off-trail travel, and monitoring for damage would reduce these effects. A long-term minor adverse impact on soils could result due to increased visitation.

Overall, actions in alternative 2 would have short-term negligible and long-term minor adverse impacts on localized portions of the park's soils.

Cumulative Effects. The recent rehabilitation of Cactus Forest Loop Drive had a short-term adverse impact on soils due to increased impervious are and a long-term negligible beneficial impact due to restoration of most of the compacted soils.

Outside the park, development in the Houghton area, Rincon/Southeast Subregional area, and Tucson Mountain Subregional area surrounding the park would continue to alter the soils surrounding the park. The construction of additional residential and commercial developments in open space between existing public lands would further increase the amount of impervious area. Pima County has adopted the *Sonoran Desert Conservation Plan* and changed their land use zoning accordingly, which may reduce some impacts associated with continued development outside the park. The development in the region would have a moderate long-term adverse impact on soils. However, if the zoning is changed so that it no longer follows the conservation plan recommendations, the long-term impacts would be adverse and major.

The Cienega Conservation Corridor is being managed by a partnership composed of private, nonprofit, and governmental partners. Potentially connecting to the Las Cienegas National Conservation Area would allow this riparian corridor to continue with traditional recreational and ranching uses, which would have a long-term beneficial effect on soils in the region. Reducing the amount of development occurring in this corridor would minimize the impacts associated with expansion of Tucson. This action would have a long-term, minor beneficial impact on soils in the region.

The creation of the Ironwood Forest National Monument west of Tucson increased the level of protection on approximately 190,000 acres of land, almost 130,000 acres of which is federal property. Development in the national monument should be limited. This action would have a long-term, minor beneficial impact on soils in the region.

Overall, the impacts of other actions described above, in combination with the impacts of alternative 2, would have moderate long-term adverse cumulative impacts on soils in the region. The contribution of alternative 2 to these cumulative impacts would be relatively small.

Conclusion. Most of the park's soils would not be affected by alternative 2. Overall, actions in alternative 2 would have a short-term negligible and long-term minor adverse impact on localized portions of the park's soils. When actions outside the park are added to alternative 2, the cumulative result would be a moderate long-term adverse effect on area soils. The contribution of alternative 2 to these cumulative impacts would be relatively small. The effects on soils from alternative 2 would not constitute an impairment of park resources or values.

Soundscapes

The management zones promote the alternative's emphasis of protecting natural resources. This alternative has the highest percentage of primitive and semi-primitive zones. These zones restrict the level of development and recommend lower levels of visitation to maintain pristine and excellent natural resource conditions. The natural zone allows for the potential of the most types of uses, such as higher trail densities, paved trails, bicycling, and stock use, which might result in greater adverse impacts on the soundscape than the primitive or semi-primitive zones. The natural zone is located in limited areas in this alternative. The combination of zones in this alternative should provide the greatest overall protection to the soundscape in the park.

Analysis. Traffic-calming devices and other facility improvement projects in alternative 2 would affect the park's soundscape in localized areas. Construction workers and equipment would generate noise during the construction or improvement of trails, housing, the Rincon Mountain District visitor center expansion, rehabilitation of existing buildings, road improvements, and parking areas. In some of these areas, the noise from construction equipment would be substantial, but it would be temporary and localized and would take place at different times and places in the park. Most noise from projects proposed in this alternative would be in or near developed areas that already are exposed to noise from vehicles, park equipment, and visitors. Depending on the presence of other facilities (such as the expanded visitor center and parking area) and people, vegetation, wind, and time of day, noise from the construction activities would have moderate short-term adverse impacts on the natural soundscape in localized areas.

Constructing a new road segment for the scenic Bajada Loop Drive would make substantial noise, causing short-term moderate adverse effects on the soundscape near the road. Only park traffic would be using the road once construction is completed. The new segment would be located near Sandario Road, so it is unlikely that traffic sounds from the loop drive would be distinguishable from traffic sounds on Sandario Road. Noise also would come from road maintenance activities on both roads, particularly during the peak use season. Thus, alternative 2 would result in a short-term moderate and long-term negligible adverse effect on the soundscape near the new road segment.

Noise levels would be likely to decrease under alternative 2 in several places that have been relatively loud in the past. Traffic-calming strategies on Picture Rocks Road should reduce vehicle speeds, resulting in lower engine noise being emitted. Slower, smoother vehicle speeds would reduce the road noise heard in wilderness areas surrounding Picture Rocks Road. Converting Golden Gate Road to a trail would further reduce road-related noise in the wilderness areas on either side of the road. These actions would result in a long-term minor beneficial impact.

If the park must use the next level of traffic-calming strategies to meet the park's desired goals for visitor experience and/or biological protection desired conditions, (i.e., installing speed bumps, fee kiosks, or a combination of the two). Slowing traffic more would further reduce noise intrusions into the park from vehicles. If this still does not enable the park to meet the desired conditions, park staff would work with Pima County to find alternative routes around the park. See the explanation of adaptive management on page 50.

Improvements at trailheads could cause localized increases in noise due to a potential increase in the numbers of visitors using the trailheads and associated trails. This would result in a negligible long-term adverse affect on the soundscape because visitors would not stay long in one area.

During the construction of improvements such as expanded parking areas and the Rincon Mountain District visitor center expansion, the short-term impacts would be minor and adverse due to noise from construction equipment, vehicles, and workers. The improvements would be spread throughout the park and over time, and the effects would be localized.

Overall, alternative 2 would have a short-term moderate adverse affect on the noise level in localized areas and a long-term negligible adverse effect on the soundscape.

Cumulative Effects. Noise in parts of the park would temporarily increase from construction activities, the operation of machinery and vehicles, and the presence of workers. At different times, short-term minor adverse effects from noise would be caused by park construction machinery, for example the recent repaving of the Cactus Forest Loop and the paving of the scenic Bajada Loop Drive.

Outside the park, the construction of the Twin Peaks Interchange could cause temporary increased commuter traffic on through-park roads in the Tucson Mountain District, which would increase noise associated with vehicles in the park. Over the long-term according to the Pima Association of Governments, Picture Rocks Road volume would increase due to the increased population on the west side of the park. This would be an undetermined long-term beneficial impact because it is unknown how many travelers on Picture Rocks Road would choose to use this new interchange.

Commercial and military aircraft would continue to regularly fly over the park generating noise intrusions in both units. Aircraft would continue to have a short-term moderate adverse impact on the soundscape during the actual flyover, and a long-term minor adverse impact because the number of flyovers should continue to be relatively small. If the number of flights over the park increases, the impact on the soundscape could increase depending on altitude of the aircraft. The park staff would work with local airport and Federal Aviation Administration authorities to minimize the impacts on the park due to a change in flight paths or number of flights over and near the park.

Overall, these effects added to noise caused by actions proposed in alternative 2, would result in short-term moderate and long-term minor cumulative adverse noise effects that are mostly in localized areas. Alternative 2's contribution to these impacts would be relatively small.

Conclusion. The soundscape in most of Saguaro National Park would continue to be relatively quiet under alternative 2. Over the long term, there would be less sources of noise in the park than in alternative 1. The construction of traffic-calming devices on through-park roads, Rincon Mountain District visitor center and parking lot expansion, and other improvement projects would cause short-term moderate adverse effects on the soundscape, mostly in areas already exposed to some noise. Overall, alternative 2 would have a short-term moderate adverse effect on the noise level in localized areas and a long-term negligible adverse effect on the soundscape.

There would be the potential for short-term moderate and minor long-term adverse cumulative effects on the soundscape from the operation of new and existing park facilities added to actions occurring outside the park. Alternative 2's contribution to these impacts would be relatively small. The park's resources and values would not be impaired by any of the proposed actions in alternative 2.

CULTURAL RESOURCES

Archeological Resources

Analysis. Archeological resources adjacent to or easily accessible to visitors from trails, roads, and picnic areas, and from designated back-

country campgrounds in the Rincon Mountain District, would continue to be vulnerable to surface disturbance, inadvertent damage, and vandalism. Deterioration of cultural remains could result by way of a loss of surface archeological materials, alteration of artifact distribution, or a reduction of contextual evidence. However, increased ranger patrolling and emphasis on visitor education would discourage vandalism and inadvertent destruction of cultural remains, and any adverse impacts would be expected to be minimal if any.

As appropriate, additional archeological surveys would precede any ground disturbance associated with excavation or construction. Ground disturbances would include development of new staff housing in the Madrona area; expansion of the Rincon Mountain District visitor center; construction of an environmental education center near the Camino Loma Alta trailhead; adaptive reuse of park housing as an education center; and any ground disturbances associated with trail maintenance, the closure and revegetation of social trails, and the construction of new trails and trailhead parking areas. National-register-eligible or -listed archeological resources would be avoided to the greatest extent possible, and no adverse effects would be anticipated. If such resources could not be avoided, an appropriate mitigation strategy would be developed in consultation with the Arizona state historic preservation officer and the traditionally associated tribes.

Before the removal or razing of the Civilian Aeronautical Administration building in the Madrona area of the Rincon Mountain District, a survey for archeological resources in the general vicinity of the affected structure would be designed and conducted in consultation with the Arizona state historic preservation officer. The excavation, recordation, and mapping of any significant cultural remains would be completed before removal or razing of the building to ensure that important archeological data that otherwise would be lost is recovered and documented.

Cumulative Impacts. Past development in the park such as trails, roads, housing, visitor centers, Manning Cabin, the later tent-platform camping at Manning Camp for trail workers and fire fighters, and the 1933-1941 construction of frame and adobe structures and rustic stone picnic facilities by the Civilian Conservation Corps may have resulted in the disturbance. There could have been loss of some archeological resources during excavation and construction activities, adversely impacting archeological resources.

In addition, agricultural, ranching, and mining practices; the development of the historic town of Tucson and current city thereof with its rapidly growing population and associated new residential areas and industrial parks, such as the University of Arizona Science and Technology Park, including the metropolitan and surrounding regional development of pedestrian walkways and hiking trails and routes and trails for bicycles on municipal and county lands and those of other federal agencies may also have adversely impacted archeological resources. Some of these types of activities continue, such as the growth and expansion of residential areas impinging upon Saguaro National Park, and could also result in future adverse impacts on archeological resources.

As described above, the impacts associated with implementation of alternative 2 are either adverse because avoidance could not be achieved and mitigation invoked or would result in no adverse effects to the park's archeological resources because avoidance could be achieved. Accordingly, the actions associated with alternative 2 could contribute both adverse and no adverse impacts to any cumulative impact. However, because avoidance would be sought, no generally adverse impacts would be associated with alternative 2. Any adverse impacts would be a very small component of the adverse

cumulative impact associated with other past, present, and reasonably foreseeable actions both within and outside the park.

Conclusion. Avoidance of national-register-listed or -eligible archeological resources during the ground disturbances of trail and building construction would result in no adverse impacts on these resources. In the event disturbance of such archeological resources could not be avoided, a memorandum of agreement, in accordance with 36 CFR Part 800.6, *Resolution of Adverse Effects*, would be negotiated between Saguaro National Park and the Arizona state historic preservation officer (and/or the Advisory Council on Historic Preservation, if necessary). The memorandum of agreement would stipulate how the adverse effects would be mitigated.

Alternative 2 would contribute no adverse impacts to the adverse impacts of actions by others occurring both within and outside the national park. However, the overall cumulative impact would remain adverse.

Because there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Saguaro National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Cultural Landscapes

Analysis. As settings for continuity or change, the desert and mountainous areas of Saguaro National Park are important character-defining features of the various potential cultural landscapes suggested in the cultural affected environment section of this document. Under alternative 2, revegetation of social trails would continue. No adverse effects would be associated with revegetation of social trails because such rehabilitation would have a beneficial impact upon potential cultural landscapes by returning them to more of a semblance of their historic appearances in the natural setting of the Sonoran Desert.

Before constructing any facilities or trail changes, cultural landscape inventories would be conducted to identify, document, analyze and evaluate cultural landscape characteristics. Such inventories would ensure that character-defining features such as topography, vegetation, circulation, spatial organization, land use, natural systems and elements, historic structures, and small-scale elements would not be affected or that the effects would be minimal. There would be no adverse effect on potential cultural landscapes.

Before the demolition of any structures that might be associated with a potential cultural landscape, the structures would be evaluated to determine if they are contributing elements to a national-register-eligible cultural landscape. If removal of a structure that is a contributing element to a national-register-eligible cultural landscape would occur, appropriate documentation recording the structure would be prepared. This would be in accordance with Section 110 (b) of the National Historic Preservation Act of 1966, as amended. Submittal of the documentation would be to the NPS Historic American Buildings Survey / Historic American Engineering Record / Historic American Landscapes Survey (HABS/HAER/HALS) program.

Cumulative Impacts. Past development in the park — such as mining and lime-making activities, trails, roads, housing, visitor centers, Manning Cabin, the later tent-platform camping at Manning Camp for trail workers and fire fighters, and the 1933-1941 construction of frame and adobe structures and rustic stone picnic facilities by the Civilian Conservation Corps — has resulted in the creation of potential historic cultural

landscapes. With the cessation of original land uses, certain structures, like the lime kilns, have deteriorated.

Prehistoric and historic human occupation and habitation including agricultural, ranching, and mining practices; the development of the historic town of Tucson and the current residential and industrial spread of the city have contributed to the history and current conditions of the potential cultural landscapes referred to the cultural affected environment section of this document. Some of these types of activities continue, such as the growth and expansion of residential areas impinging upon Saguaro National Park, and could result in future adverse impacts to cultural landscapes.

The recent rehabilitation of Cactus Forest Drive was done in accordance with the 1995 *Secretary of the Interior's Standards for the Treatment of Historic Properties,* and there was no adverse effect.

As described above, the impacts associated with implementation of alternative 2 would result in predominantly no adverse effects on the park's potential cultural landscapes. However, the few potential adverse impacts associated with alternative 2, in combination with the adverse impacts of other past, present, and reasonably foreseeable future actions, both within and outside the park, would result in an adverse cumulative impact. The adverse impacts of alternative 2 would only contribute minimally to the adverse cumulative impact.

Conclusion. No adverse effects would be associated with revegetation of social trails because such rehabilitation would have a beneficial impact upon potential cultural landscapes by returning them to more of a semblance of their historic appearances in the natural setting of the Sonoran Desert.

A site-specific study would take place if any potential cultural landscapes were to be affected by proposed actions of alternative 2, including national-register-listed or -eligible cultural landscapes, during trail and building construction activities; thus there would be no adverse impacts on these resources. In the event disturbance of such cultural landscapes could not be avoided, a memorandum of agreement, in accordance with 36 CFR Part 800.6, *Resolution of Adverse Effects*, would be negotiated between Saguaro National Park and the Arizona state historic preservation officer (and/or the Advisory Council on Historic Preservation, if necessary). The memorandum of agreement would stipulate how the adverse effects would be mitigated.

The few potential adverse impacts associated with alternative 2, in combination with the adverse impacts of actions by others, would result in an adverse cumulative impact; implementing alternative 2 would only contribute minimally to the adverse cumulative impact.

Because there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Saguaro National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Ethnographic Resources

Analysis. Management actions under alternative 2, the preferred alternative, would include placing Sandario and Kinney Roads in the Sightseeing Corridor Zone. That zone promotes a leisurely, unhurried, educational, pleasant and safe experience for visitors traveling along park corridors. Thus the road conditions adjacent to and in the vicinity of the area the Tohono O'odham use to gather saguaro fruit would be improved. This would be a moderate, beneficial, and long-term

impact on the area as an ethnographic resource. Such reductions would benefit the gathering of saguaro fruit adding to the area's tranquility and making it more suitable for traditional use. The sightseeing-zoning proposal would only better accommodate the Tohono O'odham traditional practice of gathering saguaro fruit.

Cumulative Impacts. The past park practice of allowing saguaro-fruit harvesting by the Tohono O'odham in the park's Tucson Mountain District would help support the practice of gathering saguaro fruit in the region (on the Tohono O'odham reservation), thus helping to perpetuate Tohono O'odham culture. This situation would mean a beneficial, moderate, long-term impact on saguaro-fruit harvesting as an ethnographic resource.

As described above, the impacts associated with implementing alternative 2 would be beneficial, moderate, long-term impacts on the park's ethnographic resources. Accordingly, the actions associated with alternative 2 would contribute beneficial impacts to any cumulative impact. The beneficial impacts of implementing alternative 2, however, would be very small components of the minor, beneficial, and long-term cumulative impact associated with other past, present, and reasonably foreseeable actions both within and outside the park.

Conclusion. Alternative 2, the preferred alternative, would impact beneficially and moderately for a long-term period the harvesting of saguaro fruit in the park's Tucson Mountain District. There would be no adverse effect on the area as a potential traditional cultural property. Implementation of alternative 2 would contribute only beneficially to the impacts of other past, present, and reasonably foreseeable actions occurring both within and outside the park. The cumulative effect would be beneficial, and implementation of alternative 2 would be a small contributor to the overall moderate long-term beneficial cumulative effect in the region.

The beneficial impacts of implementing alternative 2 would be very small components of the minor, beneficial, and long-term cumulative impacts.

Because road conditions involving an important ethnographic resource would be improved, there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Saguaro National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Historic Structures

Analysis. To appropriately preserve and protect national register listed or eligible historic structures, all stabilization, preservation and rehabilitation efforts, as well as daily, cyclical, and seasonal maintenance, would be undertaken in accordance with the 1995 *Secretary of the Interior's Standards for the Treatment of Historic Properties*. Stabilization, preservation, and rehabilitation would have no adverse effects upon historic structures and cultural landscapes. Sixty-five structures are entered in the park's NPS List of Classified Structures, which means that these entries are either listed in the National Register of Historic Places or eligible for listing. They would be managed for historic preservation and be in accord with the Cultural Resources Parkwide Management Zone, which is defined elsewhere in this document. This List of Classified Structures is given in appendix H.

Civilian Aeronautical Administration (CAA) Building at Madrona. The donation

of the Civilian Aeronautical Administration (CAA) building in the Madrona Area of the Rincon Mountain District to a willing taker for relocation out of the park would have an adverse effect because of its long association with the park. Razing the building would also be an adverse impact because the building would be destroyed.

Mitigation of the adverse effect of relocating or razing this building under Section 106 of the National Historic Preservation Act would be through documentation and recordation and consultation and concurrence with the Arizona state historic preservation officer for documentation.

Manning Cabin and Manning Dam at Manning Camp. Because the fire management and trail maintenance staging activities at Manning Camp would be simplified under alternative 2, there would be less general wear and tear to the historic fabric of Manning Cabin. That would be beneficial with no adverse effect. This conclusion is based upon findings of the recent report "Condition Assessment, Evaluation and Recommendations for Repair and Preservation, Manning Cabin at Manning Camp" (NPS 2005a).). There would be no change regarding Manning Dam and no adverse effect.

Cumulative Impacts. Over the years, historic structures in the park, such as remnant lime kilns, adobe and other remains of Camp Pima, and the scant remains of the Freeman Homestead, have been adversely impacted by the wear and tear associated with visitation and by natural processes like weathering. Also, change has occurred among the CCC stone picnic structures, so much so that "the only structures that have survived in their original appearance are the bathrooms" (NPS 1987a:225). Historic fabric in the form of adobe and brick houses associated with the settlement and subsequent growth of Tucson has been lost in the region, which is an adverse effect. Related to these houses, lime "for use as mortar or whitewash" (National Park Service 1987a:112) came from the lime kilns in what is now the park. Historic fabric has been lost because of settlement, mining, and ranching and because of the spread of urban population growth and modernization.

As a historic structure Cactus Forest Drive would continue to be preserved by maintaining its naturalistic and rustic Civilian Conservation Corps road design. This design fits in with the physical setting to accommodate scenic views and to show natural features to their best advantage — like stands of native cacti. Distinctive construction features such as retaining walls and guard walls and culverts of native stone would continue to be rehabilitated for historic preservation in accordance with the secretary's standards. There would be no adverse effect from continuing these actions.

As described above, the impacts associated with implementation of alternative 2 would be both not adverse and adverse on the park's historic structures. Accordingly, the actions associated with alternative 2 would contribute both no adverse and adverse impacts to any cumulative impact. The adverse impacts of implementing alternative 2, however, would be very small components of the adverse cumulative impact associated with other past, present, and reasonably foreseeable actions both within and outside the park.

Conclusion. There would be an adverse effect concerning relocating or razing the CAA building, and there would be no adverse effect with the simplification of the fire management and trail maintenance conditions on the historic fabric of Manning Cabin at Manning Camp. There would be no change regarding Manning Dam and no adverse effect.

Alternative 2 would contribute both adverse and no adverse impacts in relation to the adverse impacts of other past, present, and reasonably foreseeable actions occurring both within and outside the national park. The

overall cumulative impact would remain adverse.

The adverse impacts of implementing alternative 2 would be very small components of the adverse cumulative impact associated with actions by others both within and outside the national park.

Because there would be no adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Saguaro National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

VISITOR EXPERIENCE

Range of Recreational Opportunities

In alternative 2, both park districts would be zoned primarily with the primitive and semi-primitive zones, preserving high-quality trail and camping opportunities in a relatively pristine natural setting.

This alternative would make substantial changes to the range of recreational opportunities and the related quality of visitor experiences. Alternative 2 would include a variety of traffic-calming strategies for the scenic through-park roads, particularly Picture Rocks Road, which would improve auto-touring opportunities along these routes. There may be a slight inconvenience to auto-touring visitors related to some of the initial proposed traffic-calming strategies — such as delays at trail crossings, the visual intrusion of speed display signs, and slow downs related to increased speed enforcement. However, it is expected that the benefits to opportunities for auto-touring from the traffic-calming strategies would greatly outweigh the potential negative impacts, leading to a long-term moderate beneficial impact on visitors. If additional traffic-calming strategies were needed, such as entrance gates, to meet desired conditions on the roadways, visitors might experience a higher level of inconvenience. It would still be expected that the benefits resulting from the traffic-calming strategies would outweigh the adverse impacts on visitors' recreational opportunities.

Also related to improving auto-touring opportunities would be the paving, narrowing, and making a one-way loop configuration for the scenic Bajada Loop Drive that is proposed in this alternative. This modification to the road would improve scenic driving opportunities by reducing encounters between motorists, cyclists, and walkers because all users would travel in the same direction. This would lead to less crowding and safety conflicts on the road. In addition, by traveling only in a clockwise direction around the loop, the need to make a dangerous left turn from the scenic Bajada Loop Drive onto Sandario Road would be eliminated. Further, paving the loop would allow use of the road by a wider array of visitors. All of these benefits related to changes on scenic Bajada Loop Drive would be considered a long-term moderate beneficial impact on the range of recreational opportunities, including scenic driving opportunities.

Regarding trail opportunities, converting Golden Gate Road to a trail would provide additional mileage for hiking, horseback riding, and bicycling in the Tucson Mountain District. The trail would connect existing trails in the park, improving access and providing new routes. Trailhead parking would be developed at both ends of the proposed trail to provide access. This would be considered a long-term moderate beneficial impact on all trail user groups.

The park's comprehensive trail plan would have a long-term major beneficial impact on all trail opportunities in the park. The plan

would determine how the park would achieve the desired conditions in this general management plan's management zones, including improving trail conditions, alleviating user conflicts, and providing a high-quality trail system that meets the needs of a diverse user population. In addition, the trails plan would be developed with stake-holder input and provide rationale for any needed adjustments to the park's current trail system. Specifically in this alternative, the trail plan would explore opportunities for the following:

Tucson Mountain District
- The Natural Zone near the Valley View Overlook as well as the Natural Zone east of Sandario Road and south of Kinney Road would be considered for development of new accessible trails.
- The Natural Zone in the northwest section of land west of Sandario would be considered for interpretive trails and signs to be developed near the CCC camp.

Rincon Mountain District
- Biking opportunities would be explored along the Hope Camp Trail.
- The Camino Loma Alta trailhead would be improved.
- The Douglas Springs, Wildhorse, and Broadway trailheads would be redesigned/improved.
- Development of additional ADA-accessible trails would be explored.
- The Natural Zone in the Cactus Forest Loop Drive would be considered to allow for exploration of additional improved nature trails.

Trails in Both Districts
- Off-trail travel below 4,500 feet would be restricted to protect cultural and natural resources.
- Regional trail connections would be explored in conjunction with partners. The location of regional trail connections would be identified as part of the comprehensive trails plan.
- The location of trail access points and possible trailheads would be identified.
- The need for single-use trails to reduce trail user conflicts would be assessed as part of the comprehensive trails plan.
- The need for trail realignments to protect resources would be evaluated.

All of these proposed actions were raised as proposals for improving the park's trail systems during the public scoping process for the general management plan. Providing additional ADA-accessible trails and nature trails in a few key locations would increase the range of recreational opportunities in the park, and provide more opportunities to a wider population. These improvements would be considered a long term moderate beneficial impact. Redesigning and improving trailheads to reduce user conflicts and resource impacts and to address visitor safety concerns would improve existing recreational opportunities by facilitating access to the park's diverse trail system, a long term moderate beneficial impact. Providing single use trails may help reduce user conflicts, enhancing existing recreational opportunities – a long term moderate beneficial impact.

Increasing bicycling opportunities, particularly the connection of regional bike trails, was highly desired by many respondents during public scoping for the general management plan. An increase in bicycle trails would be a long term moderate beneficial impact for visitors interested in this type of recreational opportunity. However, the increase in bicycling opportunities might be met with some concern by visitors that feel bicycling use should not be expanded in the park due to perceived user conflicts and resource damage. Because the proposals for new bicycle trails would be limited to the peripheral areas of the park, this would not be expected to be more than a long-term minor adverse impact on visitors who would prefer that bicycling be limited to the status quo.

Finally, the restriction of off-trail travel in the Tucson Mountain District to protect sensitive resources reduces the range of recreational opportunities in the park. However, the number of visitors that are interested in off-trail travel is relatively small and there is a good supply of designated trails in the Tucson Mountain District, leading to a long term minor adverse impact on the range of recreational opportunities.

In the short term, any construction might result in negligible impacts on the visitor experience because of noise, temporarily restricted access, and visual intrusions.

Opportunities for Solitude and Getting in Touch with Nature

The emphasis on primitive and semi-primitive zoning throughout most of the park would ensure that the values of natural quiet and solitude, and opportunities for visitor contemplation, naturalness, and primitive recreation would be protected. These are some of the most highly valued characteristics of the park, and the preservation of these values would be a long-term major beneficial impact.

Some specific strategies that would aid the park in preserving the values of solitude and getting in touch with nature include the exploration of single-use trails in the comprehensive trails plan. The potential reduction in encounters between different user groups would eliminate real and perceived user conflicts, which often detract from visitors' sense of solitude and contemplation. This would be a long-term minor beneficial effect.

Further, adjustments to the fire and trail operations at Manning Camp would reduce the administrative presence at the site, minimizing the sound and visual impacts that detract from a visitor's sense of solitude and naturalness in the vicinity of the camp. These changes would result in a long-term minor beneficial impact on visitor experiences in this area.

The traffic-calming strategies on Picture Rocks and Sandario Roads would help mitigate sound impacts that are affecting the adjacent wilderness area. The current volume and speed of automobiles affect the natural ambient soundscape for up to 2 miles away from the roads (Ambrose and Florian 2006). The soundscape study identified the level of noise and the distance it carries into the surrounding area. The mitigation of some degree of these impacts due to the traffic-calming strategies would be considered a long-term minor beneficial impact on the visitor experience in the surrounding wilderness area.

Finally, the park would monitor several indicators related to visitor experience and resource impacts that identify if and when additional management strategies are needed to achieve desired conditions. There would be several indicators related to the protection of the park's values of solitude and experiencing nature, including visitor encounter levels on trails and traffic speed on roadways. The park would take all actions necessary to ensure that these indicators stay within standard to protect the highly valued opportunities for solitude in the park. The inclusion of these types of indicators in the park's monitoring program would be a long-term moderate beneficial impact. Specific actions proposed to achieve the standards identified in this management plan would be evaluated under the requirements of the National Environmental Policy Act, the National Historic Preservation Act, and other applicable laws and policies.

In the short term, any construction might result in negligible impacts on the visitor experience because of noise, temporarily restricted access, and visual intrusions.

Visitor Access, including Access for Visitors with Disabilities

Several issues related to visitor access would be resolved in this alternative. First, this alternative calls for new trailhead/access points in the east expansion area of the Tucson Mountain District. The evaluation of potential sites would be done as part of the comprehensive trails plan. This area has never been evaluated for additional recreational opportunities, and many residents that live on the east side of the Tucson Mountain District have supported additional access points. The provision of new access points in this relatively underused portion of the park would be a long-term moderate beneficial impact.

Further, traffic-calming strategies on through-park roads would likely improve access opportunities to the Tucson Mountain District. Currently, the National Park Service does not encourage visitors to use Picture Rocks Road to access the park due to the safety and visitor experience impacts caused by the conflicts with commuter traffic. If some of these impacts were mitigated with the traffic-calming strategies, then use of Picture Rocks Road by visitors to access the park would be encouraged and would likely increase. Improving access via Picture Rocks Road would be a long-term moderate beneficial impact.

This alternative would regulate access to the Madrona/Chimenea area to protect sensitive natural and cultural resources. It is likely that the Arizona State Trail would connect to the south boundary of the Rincon Mountain District, providing trail access near the Madrona/Chimenea area, which would improve access opportunities. With the potential increase in visitation, Madrona/Chimenea would be an important part of user capacity and biological monitoring programs. The park would implement a permit system if visitor use impacts indicated that further regulation on use levels was needed. Access to Madrona/Chimenea would be considered a long-term minor beneficial impact for visitors interested in this particular opportunity. The preservation of the area's pristine resources and contemplative setting through the park's visitor use monitoring program would be a long-term major beneficial impact.

Under this alternative, the location of regional trail access points and possible trailheads would be identified during the trail planning process. Making key connections to already planned and developed regional trails was of strong interest to several stakeholders and many scoping respondents. These trail connections would greatly expand the connectivity of public lands in the region and provide more diverse recreational opportunities for local residents. This would be a long-term moderate beneficial impact to people interested in these regional trail connections.

Further, this alternative proposes trailhead improvements at Camino Loma Alta, Broadway, Douglas Springs and Kings Canyon (as noted above). The details of these trailhead improvements would be included in the comprehensive trails plan. The emphasis would be on alleviating crowding and user conflicts through redesign and related infrastructure changes. These improvements, particularly at the Broadway and Douglas Springs trailheads, have been a topic of ongoing discussion, so the resolution of safety and user conflicts would be a long-term moderate beneficial impact on visitors that use these areas to access the park.

The natural zone near the Valley View Overlook, east of Sandario Road and south of Kinney Road, and near the proposed partnership education center would be considered for the development of new accessible paved nature trails. Many respondents noted interest and support for more trail opportunities for disabled visitors, as well as new nature trail opportunities for all visitors. These proposed trails would be a long-term moderate

beneficial impact for visitors interested in these types of trail experiences.

In the short term, any construction might result in negligible impacts on the visitor experience because of noise, temporarily restricted access, and visual intrusions.

Opportunities for Orientation, Education and Interpretation

In alternative 2, the Rincon Mountain District visitor center would be expanded to provide additional exhibit space, which was supported by numerous respondents during public scoping. Improving the center to be on par with the services and media available at the Tucson Mountain District visitor center would be a long-term moderate beneficial impact to opportunities for orientation and education for visitors to the Rincon Mountain District.

Further, this alternative proposes development of an education center at the south boundary of the Rincon Mountain District as partners and funding become available. An existing park structure in this district is another facility for potential adaptive reuse as an education center as funding permits. These facilities would greatly increase organized group program opportunities and educational services for the park, which would be a long-term moderate beneficial impact on park visitors and the local community. This alternative also includes staff housing at the Madrona/Chimenea area which would provide a regular staff presence that could provide site protection, visitor interpretation and visitor information specific to the sensitive resources of the site. The Madrona/Chimenea area has resources of special interest and sensitivity, so the presence of NPS staff to provide information would likely be highly desired by visitors, a long term minor beneficial impact.

In addition, this alternative would include a few waysides and designated trails in the CCC Camp area as well as a potential increase in guided walks to off-trail historic sites. Learning more about the history of human habitation of a desert environment is of interest to many visitors, but there are currently limited opportunities. Self-guided and ranger-guided walks to these little-seen historic sites would provide educational opportunities for visitors. This new opportunity would have a long-term minor beneficial impact.

Finally, this alternative calls for consideration of improved trail orientation (e.g., signs, trail etiquette materials, and maps) as part of the comprehensive trails planning effort. Many respondents mentioned the need for improved orientation to the park's trail system. Inclusion of this strategy in the comprehensive trails plan would be a long-term minor beneficial effect on opportunities for orientation.

In the short term, any construction might result in negligible impacts on the visitor experience because of noise, temporarily restricted access, and visual intrusions.

Visitor Safety

There have been 155 accidents (3 fatalities and 42 injuries) on Picture Rocks Road and 95 accidents (1 fatality and 40 injuries) on Sandario Road between 1998 and 2005 (Saguaro National Park, Chief Ranger, pers. comm. with Kerri Cahill, NPS Denver Service Center, 7/2006). In addition to actual safety conflicts, there are perceived safety conflicts on the road due to high traffic volumes and speeds during commuting hours. Many respondents commented on their concerns of safety along the through-park roads, particularly Picture Rocks Road. Many respondents asked that the National Park Service make safety improvements to the roadways. The traffic calming strategies suggested in this

alternative would be expected to reduce the number and severity of vehicle accidents along the roads by reducing vehicle speeds, particularly on Picture Rocks Road, which would be a long-term moderate beneficial impact on Tucson Mountain District visitors.

The expansion and improvements of the Rincon Mountain District visitor center would also improve the distribution of visitor safety information, leading to a long-term minor beneficial impact.

Cumulative Effects

Several recent or proposed projects in the region may contribute to cumulative impacts on the visitor experience at both districts. Regarding the range of recreational opportunities, The Pima Association of Governments *2030 Transportation Plan* proposes the addition of the Twin Peaks highway interchange at Interstate 10. If implemented, this interchange in combination with the traffic-calming strategies proposed in this alternative for the park's through-park roads would moderate traffic volume and reduce speed conflicts by providing an alternate route for commuting traffic around the park, resulting in improved scenic driving opportunities through the park — a long-term major beneficial cumulative impact.

Other projects that may influence the range of recreational opportunities in Saguaro National Park include the designation of new public lands near both districts of the park. The Las Cienegas National Conservation Area is south of the Rincon Mountain District, and the Ironwood Forest National Monument is near the western boundary of the Tucson Mountain District. Both of these new public lands are managed by the Bureau of Land Management and are undergoing planning at this time.

It is likely that these new lands would improve nature-based recreation opportunities in the region and help balance the range of recreational opportunities offered to regional visitors, including people that may visit Saguaro. The Ironwood Forest National Monument would provide extensive motor touring and bicycling opportunities, and the Las Cienegas National Conservation Area would increase the amount of wildlife watching and primitive hiking opportunities that are available nearby. In summary, these new lands in combination with the improved recreational opportunities proposed in this alterative would likely lead to a long-term moderate beneficial cumulative impact on the range of recreational opportunities.

Regarding opportunities for solitude and getting in touch with nature, the proposed Twin Peaks interchange, in combination with the proposed traffic calming strategies in this alternative, would likely help moderate current impacts to the soundscape resulting from traffic conditions on Picture Rocks Road. This would improve opportunities for solitude in the designated wilderness areas adjacent to the road in the Tucson Mountain District, leading to a long-term moderate beneficial cumulative impact.

Regarding visitor access, the proposed Twin Peaks highway interchange at Interstate 10, in combination with the traffic-calming strategies proposed in this alternative, might alleviate some of the commuting traffic pressure along Picture Rocks Road. Currently, visitor access to the north end of Tucson Mountain District is hindered by high traffic volumes and speeding, creating unsafe conditions for visitor access. This proposed interchange in combination with proposed traffic calming would be a moderate beneficial cumulative impact for visitor access opportunities.

There are no projects contributing to cumulative impacts regarding opportunities for orientation, education, and interpretation. Therefore, there would be no cumulative impacts related to this topic under alternative 2.

The proposed Twin Peaks interchange in combination with traffic calming on Picture Rocks Road would also likely contribute to cumulative impacts on visitor safety. The interchange along with the traffic-calming strategies would likely improve traffic conditions by reducing use levels and changing the pattern of use from predominately commuters to national park visitors, resulting in slower speed levels. In combination with the proposed traffic calming strategies in this alternative, the interchange would result in a long-term major beneficial cumulative impact on visitor safety.

Conclusion

Alternative 2 would result in moderate and major beneficial impacts resulting from enhanced protection of visitor experiences and recreational activities that are unique to the park, including outstanding primitive hiking and camping, opportunities for solitude and getting in touch with nature, and learning about the Sonoran Desert from an up-close perspective. In addition, the provision of new opportunities such as bicycling and educational programs would be a moderate beneficial impact on the range of recreational opportunities. Further, current adverse impacts from user conflicts on trails, increasing use in wilderness areas that may threaten visitors' opportunities for solitude, and increasing commuter traffic along through-park roads would be moderated through a variety of proposals that would improve the visitor experience in the park over the long term, resulting in moderate to major beneficial impacts.

Finally, the designation of new public lands near both districts of the park in combination with the improved recreational and visitor experience opportunities provided by Saguaro would have moderate beneficial cumulative impacts on the range of recreational opportunities and opportunities for solitude and getting in touch with nature. The proposed new Twin Peaks interchange in combination with the proposed traffic-calming strategies in this alternative would have moderate to major beneficial cumulative impacts on the range of recreational opportunities, visitor access, and visitor safety due to the likely improvement of traffic conditions on Picture Rocks Road and other through-park roads.

SOCIOECONOMIC ENVIRONMENT

Analysis

Under alternative 2, visitation would be managed and redirected, when necessary, and basic facilities for visitor safety and services would be provided inside the national park. These efforts would result in expenditures and earning gains for the local economy. Concurrently, providing a more desirable visitor experience would translate into social and economic gains for the local community. The improvements would allow the National Park Service to continue to provide a level of service that corresponds to the demand from the increasingly urban community. The local economic impacts of visitor spending would be expected to increase in a manner that is generally proportionate to population growth. Generally, national park visitors do not spend money while in the backcountry or engaged in activities such as hiking, observing nature, or participating in educational programs. Spending generally occurs outside the park at souvenir shops, restaurants, and other commercial attractions. This is particularly true for visitors who stay overnight in the area (Stynes and Sun 2003). It is expected that the improvements associated with alternative 2 might result in increased stays and, thus, increased spending in the local community.

The installation of traffic-calming devices would translate into moderate short and long-term economic gains to the local community from construction, maintenance, and enforcement expenditures and earnings. The

intent is that the visitor experience would be enhanced by implementing these measures.

Other roadways in Saguaro National Park would be reclassified, and in some cases, redesigned, to enhance the visitor experience. A secondary benefit would be improved public safety, particularly for the scenic Bajada Loop Drive in the Tucson Mountain District, where a number of traffic accidents have occurred, and along Golden Gate Road, where vehicular traffic would be prohibited. As previously mentioned, traffic accident cleanup and police monitoring are a costly public expense. The Cactus Forest Loop Drive in the Rincon Mountain District would continue as a motor tour route and would be placed in the Sightseeing Corridor Zone, potentially increasing the number of visitors to the area and associated economic benefit.

Under the ongoing trails plan for the park, trails would be evaluated to determine how Saguaro National Park would achieve the management zones desired conditions. Access to the trails through trailhead development and additional parking at the trailhead locations would be implemented. This construction and development would create short-term expenditures and earnings in the local community. Interpretive signs would also be developed. Implementing these visitor-friendly features would potentially change visitor sense of place/people-place connections in localized areas. If these improvements translate into increased visitation to Saguaro National Park and/or increased visitor stays, a moderate long-term economic gain could be realized as a result of visitor expenditures.

Access to the Madrona/Chimenea area cultural site would continue to be highly regulated to protect this sensitive natural and cultural resource. Housing and new corrals for staff would be developed and utilities would be upgraded. These developments may result in social sense of place/people-place connection impacts that would likely vary based on individual and/or social groups. Negligible short-term economic gains would be realized during the period of construction in the form of expenditures and earnings.

At Manning Camp, fire management and trail maintenance would be coordinated and a shared work center would be developed with the U.S. Forest Service. The cabin at the site would be rehabilitated to protect its historic value, and a ranger would be in attendance during the summer for law enforcement, initial fire response, interpretation, and routine maintenance. Hiring people to work at the site during the summer would have a short-term beneficial effect on local employment.

The visitor center in the Rincon Mountain District would be expanded under alternative 2, and an environmental educational center would be developed at the south boundary of this district. Short- and long-term economic gains would occur with the implementation of these projects, primarily related to additional employment. Partnerships to develop the outdoor environmental educational center would also be undertaken to assist with the funding. If these improvements translate into increased visitation to Saguaro National Park and/or increased visitor stays, a moderate long-term beneficial impact could be realized as a result of visitor expenditures.

Cumulative Impacts

The impacts of other past, present, and reasonably foreseeable actions considered would be generally the same as mentioned under alternative 1. Under alternative 2, the implementation of traffic-calming devices to slow and control commuter traffic through Saguaro National Park, would result in minor expenditures and earnings and would enhance the sense of place values associated with travel along Picture Rocks Road. Some minor short-term expenditures and earnings would occur with implementation of these

devices, including for installation and maintenance. The development of the Pima Association of Governments Transportation plan, in conjunction with the impacts of alternative 2, would result in a major long-term beneficial cumulative impact reducing the socioeconomic impact of increased commuter traffic through the park's Tucson Mountain District. Construction of the proposed new Twin Peaks interchange would reduce costs for replacement and repair of damaged resources and public safety. The impacts of alternative 2 would comprise a relatively small portion of the overall cumulative impact on the socioeconomic environment.

Conclusion

Implementation of alternative 2 would result in an overall moderate long-term beneficial effect on the socioeconomic environment. Management and enhancement of the visitor experience, while protecting natural resources, would encourage visitation to Saguaro National Park and would benefit the local community by increasing spending related to recreational activity and possibly extended stays. The emphasis on protection of sensitive resources and reduction of habitat fragmentation would also provide a moderate long-term beneficial effect by maintaining the park's naturalness and encouraging visitation. Improved traffic conditions along Picture Rocks Road through traffic-calming devices would likely encourage increased visitation and economically benefit the national park and the community through lower maintenance costs and increased visitation.

TRANSPORTATION

Analysis. Under this alternative, the park would manage Picture Rocks Road, Golden Gate Road and a portion of Sandario Road within the boundaries of the Tucson Mountain District to provide increased safety, reduced congestion, and more and safer parking. At the Rincon Mountain District, the park would construct more trailhead and visitor center parking.

Background regional growth and traffic-related impacts from the rapidly expanding Tucson metropolitan area (outlined in alternative 1) would continue to negatively impact the park's transportation system in the Tucson Mountain District.

Tucson Mountain District

The park is proposing several transportation actions in alternative 2 related to park circulation, safety and parking:

- adaptive management of traffic on Picture Rocks Road
- addition of parking south of Picture Rocks Road/Golden Gate Road
- conversion of Golden Gate Road to a trail, and
- conversion of the scenic Bajada Loop Drive/Hohokam Road to a one-way loop, road reconstruction, and partial realignment of the loop off of Sandario Road to the east.

Circulation. This alternative proposes one direct change to roadway circulation: Golden Gate Road would be converted to a trail. Traffic on Golden Gate Road (about 100 trips per day, with stable traffic volumes over the last 15 years) would be diverted to Sandario Road, Picture Rocks Road, or Mile Wide Road/Kinney Road. Visitors traveling on Picture Rocks Road could access park trails via the new Golden Gate trailhead just south of Picture Rocks Road, so some traffic would not need to divert to other routes. The *Saguaro National Park Transportation and Visitor Use Study* (David Evans and Associates 2006) projects that Hohokam Road would experience some additional traffic as a result of the out-of-direction travel required for visitors wishing to drive to the Ez-Kim-In-Zin picnic area rather than access it from the trail.

Closing Golden Gate Road would result in an increase of less than 100 trips/day on Picture Rocks Road and Sandario Road (less than a 3% increase on these roads). All three roads that would experience traffic diversion from converting Golden Gate Road to a trail have the capacity available (although Picture Rocks Road is near capacity) to absorb this small amount of traffic.

The conversion of Golden Gate Road to a trail would result in long-term, negligible adverse impacts on visitors because this road has minimal traffic now and any corresponding traffic diversion would also be minimal. There would be a long-term, negligible adverse effect on non-visitor users; this dirt road is not used by through traffic, however, non-visitor users would experience some small amount of traffic diversion from visitors on either Picture Rocks Road, Sandario Road, or Mile Wide Road/Kinney Road.

Conversion of the scenic Bajada Loop Drive/ Hohokam Road to a one-way loop will improve internal park circulation with the proposed conversion of Golden Gate Road to a trail. According to park staff observations, there are no congestion issues on this dirt road, and it is not a through road now. Further safety improvements along the scenic Bajada Loop Drive would be realized if the proposed realignment of the road could avoid Sandario Road at the west end of the loop. Conversion to a one-way loop with a new alignment off of Sandario Road would have long-term, moderate beneficial impacts to visitors — a one-way loop would result in a potential negligible impact to travel time, however, this would be off-set by the reduced accident potential along this section of Sandario Road. Impacts to non-visitor users from converting the scenic Bajada Loop Drive to a one-way loop and avoiding Sandario Road would have long-term, moderate beneficial impacts on non-visitor users by reducing the accident potential on Sandario Road. There would be some short-term, negligible to minor adverse impacts on visitors during construction along the loop because of a complete or partial loss of access. There would be no construction impacts to non-visitor users, since this dirt road is not being used by through traffic.

The goal of the adaptive management approach to traffic calming on Picture Rocks Road is to reduce speeding, the number one cause of accidents along this roadway. Traffic-calming devices that are effective at reducing speeds may also result in reduced congestion, increased travel time, and reduced accidents, and may cause individual drivers to change their use of Picture Rocks Road and divert to other east-west connections (most likely to Twin Peaks Road or Kinney Road). The extent of traffic calming impacts depends on the specific type, number, and mixture of the devices. However, using conceptual, adaptive management approach, some generalized conclusions about traffic calming impacts can be drawn:

- Low-level traffic calming (such as the use of additional law enforcement and mobile speed radar signs, testing of non-permanent solutions like a temporary roundabout) — traffic diversion is unlikely; some modest reductions in speeding and accidents may occur.
- Moderate-level traffic calming (such as the installation of parking pullout areas, neckdowns/median treatments, and/or roundabouts) — some non-visitor traffic diversion would result in decreased congestion on Picture Rocks Road and increased traffic on Twin Peaks Road and Kinney Road, and related increases to travel time and vehicle miles traveled. Speed reduction, reduced user conflicts, and lower accident rates are also likely.
- High level traffic calming (such as controlled access with an entrance station) — higher levels of non-visitor users would divert to Twin Peaks Road and Kinney Road. This level would produce the greatest reductions in user

conflicts, congestion, speeds, and accident rates.

It is important to note that as congestion rises on Picture Rocks Road with increased demand from non-visitor users, traffic speeds would begin to fall naturally (similar to what happens on congested highways). This background impact would cause an increase in travel time, and if the congestion rises high enough, traffic diversion would also naturally occur. So, some speed reduction and traffic diversion are possible even without the park's use of adaptive management techniques. However, waiting until congestion rises to this level would likely result in unacceptable safety impacts to all users and the visitor experience.

As traffic increases on Picture Rocks Road, slower speeds would result due to congested conditions; slower speeds may divert commuters to Kinney Road and Sandario Road. This diversion would result in a "ripple effect" where visitors will be impacted by faster-moving commuter traffic at additional locations (additive impacts are in effect here, since this portion of Sandario Road has a very high accident rate).

The specific type and extent of the impacts of the adaptive management approach to visitors and non-visitor users, combined with the effects of regional traffic, would be evaluated in a separate NEPA compliance document when the park is ready to implement the adaptive management approach and has specific proposals for which traffic-calming-type devices would be used, the proposed number of devices, where they would be located, and what the cumulative effects of different devices might be.

Safety. The addition of parking south of the Picture Rocks Road/Golden Gate Road intersection would provide a much needed area for slower-moving visitors to pull out of faster-moving commuter traffic. This parking should reduce conflicts between visitor and non-visitor users, resulting in a long-term, minor beneficial impact to safety for both user groups. However, although the park is proposing to convert Golden Gate Road to a trail, the addition of parking just south of the current Golden Gate Road/ Picture Rocks Road intersection would potentially offset any safety benefits that might be gained by converting the road to a trail. This would occur because the demand for trailhead parking would be similar to the demand for Golden Gate Road as an access road. In conjunction with the construction of new parking (and as part of the adaptive management plan for traffic calming on Picture Rocks Road), the park would investigate ways to improve safety in this area, such as moving the intersection away from the curve, improving sight distance, and/or installing traffic calming devices. Safety improvements and the addition of parking at the Golden Gate Road/ Picture Rocks Road intersection would result in long-term, moderate beneficial boosts to visitor and non-visitor safety, because this is the highest accident section of Picture Rocks Road.

The use of adaptive management on Picture Rocks Road will likely result in some direct and/or indirect safety changes in the short and/or long-term, with possible safety impacts to speeds, accident rates, emergency access, etc. The type and extent of these impacts to visitors and non-visitor users would be evaluated in a separate NEPA compliance document when the park is ready to implement the adaptive management approach and has specific proposals for which traffic-calming devices would be used and where the devices would be located.

The conversion of the scenic Bajada Loop Drive/Hohokam Road to a one-way loop should result in long-term, negligible beneficial impacts to visitor safety, since it would eliminate on-coming traffic on a narrow, slow-moving dirt road. There would be no effect on non-visitor users, since this is an internal park road not used by through traffic. There could be short-term, negligible

adverse impacts to visitor safety during construction of the proposed parking areas and roadbed because of the presence of heavy equipment and construction activities. There would be no safety impacts to non-visitor users, because parking and road reconstruction are not being proposed in areas used by non-visitor users.

Parking. Along with the conversion of Golden Gate Road to a trail, the park is proposing new automobile and equestrian trailhead parking just south of the Picture Rocks Road/Golden Gate Road intersection. This parking would provide parking for active enjoyment of the park, and for visitors wishing to pull out of the traffic on Picture Rocks Road and enjoy scenic views well beyond the flow of traffic. New parking south of the Picture Rocks Road/Golden Gate Road intersection would result in long-term, minor beneficial impacts on visitors because of the provision of a formal pullout parking area on Picture Rocks Road (where none is available now) and a corresponding improvement to visitor experience. The addition of new parking would have no effect on non-visitor users.

The use of adaptive management on Picture Rocks Road may result in some changes to the parking supply along this corridor. The park is proposing the addition of a parking pullout area south of Golden Gate Road as part of the conversion of that road to a trail, and not as part of the adaptive management approach. The park may provide additional pullout parking along Picture Rocks Road in the future. The type and extent of these impacts to visitors and non-visitor users would be evaluated in separate NEPA compliance documents when the park is ready to implement the adaptive management approach and has specific proposals for where the parking pullout areas would be located, and how many parking spaces would be provided.

Cumulative Impacts. The impacts to transportation in this district from the *2030 Regional Transportation Plan*, regional growth rate and comprehensive land use planning were described in alternative 1. Also, in the *2030 Regional Transportation Plan*, the Pima Association of Governments identified the need for traffic calming on Picture Rocks Road in their long-term transportation improvement plan. This implies that the safety conditions on this corridor need improvement, either by actions from the park and/or the county. If the park does not install traffic-calming devices on Picture Rocks Road (through an adaptive management approach as proposed in alternative 2), according to the *2030 Regional Transportation Plan*, the county would install the devices (the plan is not specific about where the traffic calming would occur or whether it would be within park boundaries)

Overall, alternative 2, in conjunction with the impact of other regional land use and transportation policies and actions, would have a long-term, minor adverse cumulative impact on visitors because of safety concerns and road congestion resulting from background regional growth and inadequate local transportation infrastructure to serve circulation demand. For example, even with the provision of additional transportation infrastructure called for in the *2030 Regional Transportation Plan*, traffic volumes on Picture Rocks Road are expected to rise another 20%–30% due to increasing commuter demand for east-west road links. The extent of adverse impacts on visitors would be somewhat offset by the park's proposed use of adaptive management for traffic calming on Picture Rocks Road, the addition of pullout parking and safety improvements at the Golden Gate Road/ Picture Rocks Road intersection, and the elimination of the Sandario Road portion of the scenic Bajada Loop Drive.

Alternative 2 also would have adverse impacts to non-visitors, largely as a direct result of rapid growth in northwestern Pima County, without adequate transportation

infrastructure (particularly the lack of east-west connections), public services, or economic opportunities, which would allow residents to reduce their need for east-west travel. In conjunction with the impacts of other land use and transportation policies and actions, alternative 2 would have minor short- and long-term adverse cumulative impacts on non-visitor users. The impacts of alternative 2 likely would comprise a relatively small portion of the overall cumulative impact, unless the park were to implement high levels of traffic calming such as the construction of an entrance station as a last resort to slow speeds along Picture Rocks Road.

Conclusion. The conversion of Golden Gate Road to a trail would result in long-term, negligible adverse impact on visitors because this road has minimal traffic now and any corresponding traffic diversion would be minimal. There would be a long-term, negligible adverse effect on non-visitor motorists due to some small amount of traffic diversion to other roads as described above.

Conversion of the scenic Bajada Loop Drive/ Hohokam Road to a one-way loop with a new alignment off of Sandario Road would have long-term, moderate beneficial impact on visitor and non-visitor motorists.

The implementation of adaptive management approach to traffic calming on Picture Rocks Road to reduce speeding and accidents would result in short-term, moderate to major adverse impacts to non-visitor motorists due to increased travel time and/or the diversion of motorists to alternate routes described above until the Twin Peaks interchange is built. However the implementation of traffic-calming devices would result in long-term, moderate to major beneficial impact on park visitors due to providing a safer, more appropriate and leisurely park driving experience.

The proposed new automobile and equestrian trailhead parking south of the Picture Rocks Road/Golden Gate Road intersection would result in long-term, minor beneficial impacts on visitors. Improving the intersection of Golden Gate Road/ Picture Rocks Road to provide safe access to the proposed parking area would result in long-term, moderate beneficial impacts on visitors. The addition of new parking would have a long-term negligible beneficial impact on non-visitor motorists by providing a designated safe parking area if needed.

Rincon Mountain District

The primary park-related actions proposed under alternative 2 in the Rincon Mountain District are as follows.

- Expansion of two trailhead parking areas on Speedway Boulevard and trailhead parking on Broadway
- Expansion/relocation of parking near the Rincon visitor center.

Circulation. No changes to circulation are proposed as part of this alternative, and there are no background changes locally that would impact circulation in this area. There would be no long-term impacts to visitor circulation. Visitors may experience some short-term, negligible to minor adverse impacts while new parking is being constructed at the trailheads.

Cactus Forest Drive has excess capacity available for additional visitation. Access roads to the park (Speedway, Broadway, and Old Spanish Trail) have plenty of additional capacity, and all are operating at or above Level of Service C. Additional traffic from modest increases in visitation or changes in visitation patterns may result in increased congestion at the park entrance; however, this intersection has capacity available (currently LOS A) to accommodate additional visitation. As visitation rises, the area between the entrance station and Old Spanish Trail may experience a corresponding increase in congestion, since staff has already observed

some traffic queuing in this area at peak times. With the additional parking proposed for the Speedway and Broadway trailheads the lack of congestion would be a long-term moderate beneficial impact. However, non-visitor users may experience long-term, negligible adverse impacts due to some additional traffic on these roads en route to the parking areas. However, these are not through roads and have excess capacity for additional visitation.

As growth occurs in Tucson, Old Spanish Trail, Escalante Road, Freeman Road, Broadway Boulevard and Speedway Boulevard (the roads providing primary access to the park) and other regional roadways en route to the park would experience background increases in traffic levels that visitors would encounter en route to the park. This alternative would have long-term, negligible, adverse impacts to visitors, since the capacity exists to handle additional visitation and background growth with either with existing facilities and/or minor changes to park operations.

Safety. This alternative proposes to expand the visitor center parking lot. This presents an opportunity to improve management by avoiding conflicts with periodic traffic queues from the entrance station. This would result in a long-term, minor beneficial impact to visitor safety.

Parking. Expansion of the parking at the Wildhorse and Douglas Springs trailheads and the Rincon visitor center is proposed in this alternative. ADA-required spaces would be incorporated into all construction. New parking should be sufficient to address current demands and provide some increase in demand as visitation rises along with regional growth. There would be some short-term, negligible to minor adverse impact during construction of parking; however, all the parking proposals would ultimately result in long-term, minor beneficial impacts to visitors as a result of additional parking capacity.

Cumulative Impacts. The impacts to transportation in this district from the *2030 Regional Transportation Plan*, regional growth rate and comprehensive land use planning were described in alternative 1. There was a short-term, negligible to minor adverse impact on visitor circulation during the recent reconstruction of the Cactus Forest Loop. Reconstruction of Cactus Forest Loop had a very short-term, negligible adverse effect on traffic outside the park entrance during construction in that area. The impacts of alternative 2, in conjunction with the impacts of other regional transportation-related plans and actions, would have negligible short- and long-term adverse cumulative impacts to circulation in this district. Impacts of alternative 2 would comprise a very small portion of the overall cumulative impact.

Parking in this district is already beyond capacity in most areas. Impacts of park visitation on regional roadways would be very small because as the road network in this area has many east-west and north-south options and any increases in visitation could be effectively spread out over the network, decreasing the possibility of congestion and safety concerns. Overall, impacts of alternative 2, along with the impacts of other plans and actions, would result in minor adverse cumulative impacts to parking. Alternative 2 would contribute a small increment relative to the overall cumulative impact.

Conclusion. There would be no long-term impacts to visitor circulation. Visitors may experience some short-term, negligible to minor adverse impacts while new parking is being constructed at the Golden Gate trailhead

This alternative proposes to expand the visitor center parking lot. This would result in a long-term, minor beneficial impact to visitor safety.

With the additional parking proposed for the Speedway and Broadway trailheads, the lack of congestion would be a long-term moderate

beneficial impact. However, non-visitor users may experience long-term, negligible adverse impacts due to some additional traffic on these roads en route to the parking areas.

Expansion of the parking at the Wildhorse and Douglas Springs trailheads and the Rincon visitor center is proposed in this alternative. There would some short-term, negligible to minor adverse impact during construction of parking; however, all the parking proposals would ultimately result in long-term, minor beneficial impacts to visitors as a result of additional parking capacity.

PARK OPERATIONS

The emphasis of alternative 2 is directed toward enhancing the protection of the park's ecological processes and biological diversity. Impacts on park operations under alternative 2 would be primarily in the areas of science and resource management, visitor and resource protection, trail maintenance, and interpretation. In addition to the minimum operating level of 76.5 employees, the following positions would be necessary if alternative 2 was implemented:

3 biological technician positions (to manage park natural resources in a pristine to excellent condition, to preserve wildlife habitat, and to restore natural vegetation)
2 law enforcement rangers (to regulate and protect sensitive natural and cultural resources in the Madrona section of the park, for law enforcement on park roads to ensure that drivers are traveling at safe speed limits, to assist with potential traffic and circulation problems, and to respond to visitor encounters with wildlife and other emergencies
2.5 trail workers (for restoration and rehabilitation of existing trails, potential opportunities for developing bicycle trails and connecting park trails to regional trail networks)
1 education specialist (for the proposed education centers
1 community planner (to manage the proposed park's partnerships program)

Public Facilities

Trails and Trailheads. A comprehensive trail plan is being developed and would recommend sustainable trail design, trail realignment/rehabilitation. The comprehensive trail plan would be an improvement to current trail management strategies that are either limited or piecemeal in nature and would result in a long-term major beneficial effect on park operations through reduced trail maintenance and reduced user conflicts requiring additional staff time.

Off-trail travel below 4,500 feet would be restricted. The development of regional trail connections and single-use trails, if recommended in the comprehensive trails plan and implemented, would create short-term moderate adverse effects on park operations due to the staff time required to build these trails and connections.

The Camino Loma Trailhead would be improved, and the Douglas Springs, Wildhorse, and Broadway trailheads would be improved and redesigned. If recommended in the comprehensive trails plan and implemented, the Hope Camp Trail in the Rincon Mountain District would be developed as a bicycle trail. Also, new ADA-accessible trail opportunities would be explored, especially inside Cactus Forest Loop Drive. New designs and new designated uses would create both short- and long-term minor adverse effects on park operations as a result of increased maintenance and staff time requirements.

In the Tucson Mountain District, new trailheads and parking would be developed at both ends of the proposed Golden Gate Trail. The conversion of Golden Gate Road to a trail would have short-term moderate adverse impacts on park operations during the conversion process, but would create major

beneficial effects on park operations over the long term as a result of decreased maintenance requirements.

If recommended in the comprehensive trails plan and implemented, accessible trails would be developed at Valley View Lookout, and new trails would be designed and constructed between Sandario and Kinney roads and in the former CCC camp area (in the northwestern half-section, west of Sandario Road). New trails would create moderate adverse short-term impacts on park staff time during construction and long-term minor adverse impacts on park operations as a result of increased maintenance requirements.

The trails plan would also consider developing bicycling trails along the gas pipeline right-of-way near the eastern boundary of the district and improvement of the Kings Canyon trailhead. If these trails are developed/ redesigned, these actions would have a short-term minor adverse impact on park operations during construction and a long-term minor adverse impact on park operations as a result of increased maintenance and staff time requirements once the trails are built.

Park Roads and Entrance Stations. Under alternative 2, the primary changes to park roads would consist of installing intensive traffic-calming devices on Picture Rocks Road and the permanent conversion of Golden Gate Road (between Ez-Kim-In-Zin and Picture Rocks Road) to a trail.

Installation of traffic-calming devices would create a short term moderate adverse effect on park operations as a result of initial investment, construction, and the necessary precautions to provide a safe environment for employees and road users during construction. The long-term effects related to annual maintenance on these new facilities would be minor and adverse.

If additional traffic calming is needed, the adverse effects of installing devices on staff time and the potential permanent staffing requirements of two new entrance stations/fee kiosks would be considerably offset as a result of increased entrance fee revenue collected and would constitute a negligible effect on park operations.

Installation of these devices would also be accompanied by a limited period of increased law enforcement to ensure compliance with desired traffic management conditions would create an additional short-term moderate adverse effect on park operations. Over the long term, the installation of these devices would be expected to decrease the need for law enforcement and emergency services along Picture Rocks Road and would therefore create a major beneficial effect on park operations.

Converting Golden Gate Road to a trail would create an immediate short-term moderate adverse effect on park operations due to staff requirements for road removal, but in the long term would create an overall major beneficial effect on park operations because of decreased annual maintenance. Additionally, the conversion of this road to a trail would eliminate the considerable deferred maintenance cost that currently exists due to the poor condition of this road.

Making the scenic Bajada Loop Drive one-way and narrowing it would have moderate short-term adverse impacts on park operations during construction. Minor to moderate beneficial impacts would occur over the long term because reconstruction would not be needed after each major rain and there would be a decrease in law enforcement and emergency response staff requirements as a result of safer conditions.

Parking Areas. Parking areas would be formalized and expanded at trailheads and at the Rincon Mountain District visitor center. As long as increases in parking areas and availability are proportionate to user capacity thresholds for the park and this new develop-

ment does not create a larger management problem in the long run as a result of increased use, it is expected that park operations would experience long-term minor beneficial effects under alternative 2 with regard to parking improvements. More designated and better-defined parking would both decrease the need for park traffic management and lessen the impact on natural resources, thereby reducing staff time required to mitigate those impacts. Park operations would experience short-term moderate adverse effects as a result of construction activities.

Visitor and Education Centers. The Rincon Mountain District visitor center would be expanded under this alternative. Visitation to this facility has steadily increased over the past 50 years. A rehabilitated building with a new addition would better accommodate larger crowds through proper design and would improve the operational efficiency of this building. Outdated and inefficient building infrastructure currently requires frequent repair and maintenance to address regular breakdowns. A total overhaul of mechanical systems and upgrade of the existing building would greatly reduce the deferred maintenance backlog for this building. Under this alternative, offices in the annex building, which would become an education center, would be moved to the expanded area in the visitor center and/or to the existing park housing facility. The expansion and upgrade of the visitor center would create short-term moderate adverse effects on park operations during construction, but would in the long term be a major beneficial effect on park operations because of increased efficiency of park operations and elimination of the mix of incompatible uses. Long-term minor adverse effects would be expected as a result of increased maintenance requirements due to an increase in facility size.

A partnership education center would be constructed at Camino Loma Alta. This facility would have a long-term major beneficial effect on park operations because of increased facilities to assist park staff in educating visitors. There would be minor adverse effects on park operations in the short term as a result of construction activities and in the long term as a result of increased requirements for facility maintenance.

Orientation, Wayside Exhibits, and Interior Exhibits. Interior exhibits in the Rincon Mountain District visitor center would be updated under this alternative. Additional wayside exhibits would be added on some existing and proposed interpretive trails. Orientation panels would be updated and added at park trailheads during trailhead improvements. New interpretive exhibits and information panels would assist staff in educating the public about the park. The new exhibits and panels would create a long-term moderate beneficial effect on park operations related to visitor services, but would also create a minor long-term adverse impact on park operations due to the need for ongoing maintenance. There would be short term moderate adverse effects during installation from needed staff time.

Camping. The effects on park operations related to backcountry camping management would be negligible, because no additional campgrounds would be developed under this alternative. Impacts would continue to relate primarily to staffing requirements for backcountry patrols.

Administrative Facilities

Offices, Storage, and Park Buildings. As described above under visitor and education centers, the effect of having new office space in a portion of the visitor center and/or existing park housing facility would be a long-term major beneficial effect on park operations because of increased space and efficiency and the elimination of incompatible uses in the same spaces.

Corrals. The corral at Madrona would be removed. A new corral would be constructed outside the riparian zone to support packing operations for fire management and trail operations. There would be short term, minor adverse effects during removal of the corral and during construction of a new corral due to staffing requirements. There would be long-term moderate beneficial effects as a result of the use of this proposed new facility and minor adverse effects due to necessary maintenance over the long term.

Park Housing. Park housing at Madrona would be removed and a new house would be constructed to meet current codes. This new house would create long term major beneficial effects on park operations because of the presence of park staff on site in the Madrona area. The need for potable water to be hauled to this site for use by park staff under this alternative would create a long-term moderate adverse effect on park operations. Together, the adverse and beneficial long-term effects on park operations resulting from this alternative would be long-term, minor, and beneficial. There would be a short-term minor adverse effect on park operations during building construction due to staffing requirements.

Other Buildings and Facilities. Fire and trail crew support facilities would be reduced at Manning Camp. The historic buildings would be preserved and other structures along with the developed water system, corrals, and vault toilet would remain at Manning Camp and be maintained by park staff for possible future use. This action would result in a long-term moderate beneficial effect on park operations during fire crew activities on Mica Mountain from decreased need for transport of supplies to service this remote site. However, a long-term moderate adverse effect on park operations would likely occur as a result of required maintenance and upkeep of facilities at Manning Camp. The overall effect on park operations related to Manning Camp would be negligible.

The Civilian Aeronautical Administration building at Madrona would be donated to an interested organization and relocated or would be documented and razed. The removal of this building would create long-term moderate beneficial effects on park operations by removing stabilization and preservation requirements for this building. There would be short-term minor adverse effects on park operations during removal.

Cumulative Impacts

As described in chapter 2, alternative 2 proposes several changes to park management, including facility improvements and increased staff to address and accommodate increased visitation. These changes would create an overall improvement to current management practices regarding effective visitor services and performance of required duties to manage Saguaro National Park as legislated by Congress.

The recently (2006) rehabilitated Cactus Forest Drive created minor long-term beneficial effects because it is a defined, closed loop tour road, requiring less maintenance time for park staff.

An increase in unregulated social trails into and within park boundaries is expected to occur as a result of new development on adjacent private lands and would require additional staff time to correct, repair, and manage associated adverse effects. The occurrence of invasive exotic plants in the park also is expected to increase as new development on adjacent lands would inevitably introduce exotic, invasive, ornamental species, which would also require additional park staff time to manage and control the associated adverse effects.

Impermeable hardened surfaces, buildings, and constructed barriers associated with development all influence and impact the natural migration of native species and would

further create habitat fragmentation in the greater Tucson region. Park staff would be required to manage adverse effects. The incremental impacts on cultural resources in the park would continue to require park staff time and effort to enforce, monitor and correct adverse effects.

The anticipated increase in visitation to Saguaro National Park and increasing development on adjacent private lands would require greater staff intervention to provide adequate visitor services and to address associated resource impacts. Alternative 2 would mitigate some of the incremental adverse effects on park operations created by increased visitation and use in the short term by increasing staff and improving facilities. Even with additional staff and improved facilities, the above-mentioned actions, in combination with actions proposed under alternative 2, would likely continue to create minor adverse cumulative impacts on park operations due to the increased management requirements necessary to address these issues. Cumulative impacts could become greater if an adequate ratio between staff and visitors is not maintained or facility conditions fail to meet demand and need over the long term.

Conclusion

Filling additional positions to meet the proposed actions described under alternative 2 would be expected to create long-term moderate beneficial effects on park staff engaged in activities such as protecting biodiversity and resource and visitor protection.

Actions in alternative 2 that would create short-term moderate adverse impacts on park operations due to construction and implementation requirements include the installation of traffic-calming devices along Picture Rocks Road, the development of the partnership environmental education center, the conversion of Golden Gate Road to a trail, the construction of new parking areas, the removal of some facilities at Manning Camp, and the expansion of the Rincon Mountain visitor center with new exhibits. The relocation of park offices to a new facility would also constitute a short-term moderate adverse effect on park operations during this transition.

There would be long term minor adverse effects as a result of increased maintenance required to service new exhibits, the removal of park housing and corral at Madrona and rebuilding the corral to minimize resource impacts, developing a larger Rincon Mountain visitor center, developing the partnership environmental education center, converting office space for use as an education center, and proposing new trails under this alternative.

Actions in alternative 2 that would create long-term major beneficial impacts on park operations and facilities include improvements to trails and trailheads, the addition of the partnership environmental education center, the conversion of Golden Gate Road to a trail, expansion of the Rincon Mountain District visitor center, construction of traffic-calming devices along the Picture Rocks Road, and development of adequate office space for park staff.

Actions that would create long-term moderate beneficial effects on park operations and facilities include the removal and relocation of the CAA building, the removal and reconstruction of the corral and park housing at Madrona, the reduction of equipment and personnel at Manning Camp, and the new exhibits and other interpretive media installed in the Rincon Mountain visitor center and at key locations around the park.

As long as increases in parking areas and availability are proportionate to user capacity thresholds for the park and this new development does not create a larger management problem in the long run as a result of

increased use, it is expected that long-term effects would be minor beneficial under alternative 2.

Although increased staffing would be realized under this alternative, and the impacts would be mitigated, the overall cumulative effects on park operations would be minor and adverse over the long term.

UNAVOIDABLE ADVERSE IMPACTS

The following paragraphs describe the more important (moderate and major intensity) adverse impacts that would result from implementing this alternative. These are residual impacts that would remain after mitigation was implemented. The negligible and minor impacts are described in the foregoing analysis.

There would likely be a short-term moderate adverse impact on native vegetation during construction activities such as new trailheads, visitor center expansion, improved parking lots, and the new scenic Bajada Loop Drive segment. Construction activities would also have a short-term moderate adverse impact on wildlife.

Localized increases in noise/the soundscape would occur during construction, resulting in a moderate short-term adverse impact.

Manning Camp would continue to adversely impact park operations as a result of the intensive support required to maintain operations at this facility under this alternative.

Under all alternatives, proposed actions would strictly avoid known archeological sites. Any such sites that could not be avoided because of ground-disturbing activity would be mitigated in concurrence with the Arizona state historic preservation officer. Mitigation such as data recovery would constitute an unavoidable adverse impact on the archeological sites involved.

Under alternatives 2 and 3 in the Madrona area of the Rincon Mountain District, there would be documentation and recordation as mitigation in concurrence with the Arizona state historic preservation officer about donating the Civilian Aeronautical Administration building to a willing taker and removing and relocating it out of the park, or razing it. Either relocating or razing the CAA building would be an unavoidable adverse impact on this historic property.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The irretrievable and irreversible commitments of resources that are associated with this alternative are summarized below. Irreversible commitments are those that cannot be reversed, except perhaps in the extreme long term (e.g., the regrowth of an old-growth forest). Irretrievable commitments are those that are lost for a period of time (e.g., if a road is constructed, the vegetative productivity is lost for as long as the road remains).

The expanded visitor center would result in a loss of vegetative productivity and wildlife habitat for as long as the structure remains.

The new scenic Bajada Loop Drive segment would cause a loss in the vegetative productivity of the soil under the roadway for as long as the road remains.

For cultural resources under any of the alternatives, although not anticipated, the mitigation of any archeological sites would constitute an irreversible and irretrievable commitment of resources. Mitigation such as data recovery would change the status of archeological artifacts and other archeological information and data from in situ preservation for the future to current extraction via excavation. It is possible that some information

might be lost in the process because future excavation methods could improve, thereby potentially yielding more information than current methods provide.

Under alternatives 2 and 3, relocating the Civilian Aeronautical Administration building out of the park, or razing it, would not only be an unavoidable adverse impact on this historic property but also an irreversible and irretrievable commitment of resources. The historic fabric of the building would irreversibly change, or it simply would not physically exist any more.

RELATIONSHIPS BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Most of the park would be protected in a natural state and would maintain its long-term productivity under alternative 2. Only a very small percentage of the park would be converted to developed areas. Short-term impacts would result from construction, such as localized increases in air pollutants, as detailed in the foregoing analysis. Noise and human activity from construction and restoration activities might displace some wildlife from the immediate area. However, these activities would not jeopardize the long-term productivity of the environment.

IMPACTS OF IMPLEMENTING ALTERNATIVE 3

NATURAL RESOURCES

The management zones promote the alternative's emphasis of providing a wider range of opportunities for visitors while protecting the park's resources. This alternative has the highest percentage of natural zone. The natural zone allows for the potential of the most types of uses such as higher trail densities, paved trails, bicycling, and stock use. Higher levels of development are allowed in the natural zone, which can have adverse impacts on vegetation at the site where the facilities are located. Most of the park is zoned primitive and semi-primitive because these zones are the ones that are appropriate for wilderness. These zones restrict the level of development and recommend lower levels of visitation to maintain pristine and excellent natural resource conditions. Overall, the combination of zones in this alternative should have less long-term adverse impacts on vegetation in the park than the no-action alternative.

Vegetation

Analysis. Vegetation would be lost or altered in local areas under alternative 3 as in alternative 2, primarily from the development or improvement of facilities and visitor services. Most new developments/improvements would be placed in the footprint of disturbed areas where vegetation already has been altered; therefore, little additional loss of native vegetation would result from construction, rehabilitation, or trailhead improvements. Given the previous vegetation disturbance in most of these areas, and with the use of appropriate mitigative measures to minimize impacts (such as ensuring that the equipment would stay within project area boundaries, revegetating disturbed areas, and taking steps to avoid the spread of exotic species), the adverse effects on native vegetation from these actions would be minor.

The installation of traffic-calming devices (adaptive management) could result in short-term adverse impacts on vegetation. The devices could include curb and guttering, roundabouts, and road signs. The equipment needed to install the devices would need to be placed near the road. If the staging area was on an unimproved surface, vegetation would be trampled and crushed. Mitigative measures would include placing equipment in previously disturbed areas and revegetation of the sites. The installation would have short-term negligible adverse impacts. The long-term impacts would be minor and beneficial due to the restriction of informal pull-off locations and slower speeds, which would allow for better handling of vehicles on the road and less roadside vegetation damage.

Several indirect impacts also could result from installing traffic-calming devices. If erosion along the road increased because of the installation of these devices, more vegetation would be lost. Nonnative plants could be introduced or spread into disturbed areas during installation. If visitors parked on the side of the road, some roadside plants might be crushed, trampled, or picked. Roadside vegetation might also be inadvertently trimmed or removed during routine maintenance of the traffic-calming devices. Mitigative measures such as improved drainage and adding formal pull-off areas, and revegetation of disturbed areas would minimize the potential for vegetation loss. Depending on the location and design of the traffic-calming devices, the disturbance to vegetation would be relatively small; therefore, the indirect long-term adverse effects on native vegetation would be negligible.

If the park's desired conditions for visitor experience and/or biological protection still

were not met, the next level of traffic-calming would be implemented. This could consist of installing speed bumps, fee kiosks, or a combination of the two. Slowing traffic more would further improve habitat conditions on through-park roads by decreasing the risk of vegetation damage due to accidents and ensuring that visitors have an improved chance of stopping at formal pull-outs instead of creating their own.

If this still does not enable the park to meet their goals, the final step would be to work with Pima County to develop alternate routes around the park. This action would be beneficial to vegetation in the park.

The visitor center and parking area expansion in the Rincon Mountain District would occur between the visitor center and the headquarters, in a somewhat disturbed area. The new primitive campgrounds would be built in previously undisturbed areas. Despite the use of mitigative measures to help reduce the loss of native vegetation, some vegetation would be permanently disturbed or lost in these areas — a long-term minor adverse impact.

Vegetation also would be altered or lost through visitation in alternative 3. As in alternatives 1 and 2, people walking over and trampling plants in and around existing facilities would result in the loss of native vegetation, a long-term, minor adverse effect.

The creation of a visitor contact station and science center at Madrona would also have beneficial effects on vegetation in that area by having an on-site staff presence to educate people about the sensitive riparian vegetation. This would have a long-term minor beneficial impact on area vegetation.

The removal of fire and trail crew support activities at Manning Camp would have a short-term minor adverse impact on vegetation because removal operations might disturb vegetation. Short-term minor adverse impacts on vegetation would occur during construction activities. Mitigation would include revegetation of work areas. Over the long term, removal would have a moderate beneficial impact because the regular presence of people would be drastically reduced and thus vegetation would have a chance to grow in disturbed areas. Temporary spike camps would have localized short-term minor impacts on vegetation because the camps would be removed upon completion of the work assignment.

Surveys for rare plants would be conducted before developments were constructed in alternative 3, and in most cases developments (trailhead and visitor facilities improvements) could be sited to avoid effects on these populations. Overall, alternative 3 would have short-term moderate and long-term minor adverse impacts on vegetation.

Cumulative Effects. The recent rehabilitation of Cactus Forest Loop Drive had negligible short-term and long-term beneficial impacts on vegetation.

Outside the park, development in the Houghton area, Rincon/Southeast Subregional area, and Tucson Mountain Subregional area surrounding the park would continue to alter the types and distribution of vegetation. The areas have been zoned to protect habitat while allowing for growth and expansion of Tucson. The long-term adverse impacts on vegetation from development would be moderate.

The Cienega Conservation Corridor is being managed by a partnership composed of private, nonprofit, and governmental partners. Potentially connecting to the Las Cienegas National Conservation Area would allow this riparian corridor to continue with traditional recreational and ranching uses, which would have a long-term beneficial effect on vegetation. The corridor would protect an area south of the Rincon Mountain District and Coronado National Forest to the Las Cienegas National Conservation Area. This

would have a long-term moderate beneficial impact on vegetation in the region.

The creation of the Ironwood Forest National Monument west of Tucson increased the level of protection on approximately 190,000 acres, almost 130,000 acres of which is federal property. This action, added to the effects of increasing educational and interpretive efforts, would result in better protection of native vegetation and its possible decrease in previously disturbed areas. The creation of this area would continue to have a long-term moderate beneficial impact on vegetation in the region.

Overall, when all the effects of actions in and outside the park were added to the effects from actions proposed in alternative 3, the long-term adverse cumulative effects on vegetation in the area would be minor. The beneficial impacts of several projects outside the park negate some of the adverse impacts from other outside projects. The contribution of alternative 3 to these cumulative impacts would be relatively small.

Conclusion. Most native vegetation in Saguaro National Park would continue to be protected and self-sustaining under alternative 3. Overall, alternative 3 would have short-term moderate and long-term minor adverse impacts on vegetation.

The long-term cumulative effects on vegetation from alternative 3 and other actions in and outside the park would be minor and adverse. The contribution of alternative 3 to these cumulative impacts would be relatively small. The levels of these effects would not be sufficient to constitute an impairment of park resources or values.

Wildlife

The management zones promote the alternative's emphasis of providing a wider range of opportunities for visitors while protecting the park's resources. This alternative has the highest percentage of natural zone. The natural zone allows for the potential of the most types of uses such as higher trail densities, paved trails, bicycling, and stock use. Higher levels of development are allowed in the natural zone, which can have adverse impacts on wildlife at the site and near where the facilities are located. Most of the park is zoned primitive and semi-primitive because these zones are the ones that are appropriate for wilderness. These zones restrict the level of development and recommend lower levels of visitation to maintain pristine and excellent natural resource conditions. Overall, the combination of zones in this alternative should have less long-term adverse impacts on wildlife in the park than the no-action alternative.

Analysis. Although several facility improvements would be made under alternative 3, most would be done in already disturbed areas such as the Rincon Mountain District visitor center and parking expansion area, visitor contact station and science station at Madrona, and trailhead improvements. Most wildlife populations and their habitats have been altered by past human actions in these areas, and little additional habitat would be lost. Increased noise and human activity from construction activities could temporarily displace some animals such as rodents, reptiles, and birds, resulting in minor short-term adverse impacts on wildlife populations in local areas.

Increased visitation and types of visitor activities could indirectly affect some wildlife, but any disturbance would be an intermittent minor adverse impact.

The installation of traffic-calming devices would have temporary short-term adverse impacts on wildlife. Noise from construction equipment and people would displace some wildlife. Most birds, mammals, rodents and reptiles would avoid the area during the construction period, but many would return

after construction ceased. Some animals, primarily invertebrates, would be unable to move out of the construction area and would be killed. The short-term adverse impacts would be minor.

The traffic-calming devices also would have indirect impacts on wildlife. The reduced vehicle speeds should allow wildlife more time to cross the road and reduce the number hit by vehicles and injured or killed along through-park roads, resulting in beneficial impacts. Maintenance of the traffic-calming devices and the road also could disturb wildlife. The extent of the effects would depend partly on the location and nature of the maintenance activities. With careful design of the traffic-calming devices there would be a long-term minor beneficial indirect effect on area wildlife.

If needed to meet the park's desired conditions for visitor experience and/or biological protection, the next level of traffic calming strategies would be implemented — installing speed bumps, fee kiosks, or a combination of the two. Slowing traffic more would further improve wildlife habitat conditions on through-park roads by decreasing the risk of wildlife being hit by vehicles.

If this still does not enable to the park to meet their goals, the final step would be to work with Pima County to find alternative routes around the park.

The visitor center expansion and new visitor center parking in the Rincon Mountain District would be built between the visitor center and park headquarters, in a somewhat disturbed area. The new primitive campgrounds would be built in previously undisturbed areas. These actions could result in the permanent loss of some habitat. Construction activities also would temporarily disturb and displace animals near these facilities. The species primarily affected would be some smaller, less mobile wildlife species and species with smaller home ranges, such as invertebrates. Some reptiles, small mammals, and birds would be displaced. The short-term adverse impacts during construction would be moderate. The loss of habitat and some animals would be mitigated through revegetation and would result in a long-term minor adverse effect on these populations.

As in alternative 2, visitation to parts of the park probably would be increased from improving trailheads throughout the park and developing new trails and trailheads in the expansion areas of the Tucson Mountain District along with allowing more types of use throughout the park. In turn, habitat fragmentation would increase over current levels because of more visitor use of trails and routes. The increase would be greater than under alternative 2 because the management focus of this alternative would be on improving visitor access and variety of recreational opportunities. Habitat fragmentation would affect movement corridors of some wildlife such as mountain lions. This would result in long-term minor adverse effect. Some wildlife sensitive to the presence of people might be displaced from areas around these corridors during the peak high use season. These actions would result in short-term and long-term minor adverse impacts on wildlife populations in local areas, depending on such factors as the level, duration, and type of visitor use; the season of use; and the wildlife species.

As with vegetation, increased educational and interpretive efforts under alternative 2 would generally benefit wildlife. The addition of waysides and interpretive trails would help educate visitors, increasing their appreciation of the park's wildlife and minimizing impacts from actions such as feeding wildlife. The long-term beneficial effect on the park's wildlife would be minor.

Overall, alternative 3 would have short-term, moderate and long-term minor adverse impacts.

Cumulative Effects. The rehabilitation of Cactus Forest Loop Drive created negligible long-term adverse impacts on wildlife.

Outside the park, development in the Houghton area, Rincon/Southeast Subregional area, and Tucson Mountain Subregional area surrounding the park would continue to alter the types and distribution of habitat available to wildlife. The areas have been zoned to protect essential habitat while allowing for growth and expansion of the City of Tucson. An increase in the number of structures and people in the currently undeveloped areas would reduce the amount of habitat available. Some wildlife would be displaced such as small mammals, rodents, reptiles, and birds by the expansion of residential and commercial developments. Development within the Cienega Conservation Corridor would have the largest impact on wildlife because this is a key biological movement corridor for large mammals and it connects the Rincon Mountains with the Santa Rita and Empire Mountains. The long-term adverse impacts would be moderate.

The Cienega Conservation Corridor is being managed by a partnership composed of private, nonprofit, and governmental partners. Potentially connecting to the Las Cienegas National Conservation Area would allow this riparian corridor to continue with traditional recreational and ranching uses, which would continue to protect this area. This addition would have a long-term beneficial effect on wildlife. Increasing protection of this biological corridor would allow easier movement of wildlife between mountain ranges.

The creation of the Ironwood Forest National Monument west of Tucson increased the level of protection on approximately 190,000 acres, 130,000 acres of which is federal property. This would continue to have a long-term moderate beneficial impact on wildlife in the region.

Overall, when the effects of alternative 3 were added to other actions within and outside the park, there would be moderate long-term adverse cumulative impacts on area wildlife populations. Alternative 3's portion of this impact would be relatively small.

Conclusion. Most wildlife populations and habitats in Saguaro National Park would continue to be protected and would not be changed by the actions proposed in this alternative. Overall, alternative 3 would result in short-term moderate and long-term minor adverse effects on the park's wildlife populations and habitats.

The effects of alternative 3 and actions outside the park on area wildlife and their habitat would result in a cumulative long-term moderate adverse effect. Alternative 3's portion of this impact would be relatively small. None of the effects on wildlife from alternative 3 would impair park resources or values.

Threatened and Endangered Species and Species of Concern

The management zones promote the alternative's emphasis of providing a wider range of opportunities for visitors while protecting the park's resources. This alternative has the highest percentage of natural zone. The natural zone allows for the potential of the most types of uses such as higher trail densities, paved trails, bicycling, and stock use. Higher levels of development are allowed in the natural zone, which could but is not likely to have adverse impacts on threatened and endangered species at or near where the facilities are located. Most of the park is zoned primitive and semi-primitive because these zones promote wilderness qualities necessary in designated wilderness. These zones restrict the level of development and recommend lower levels of visitation to maintain pristine and excellent natural resource conditions. Overall, the combination of zones in this alternative should be less likely to have long-

term adverse impacts on threatened and endangered species in the park than the no-action alternative.

Analysis. No proposed projects in alternative 3 would be in areas known to contain lesser long-nosed bat, Mexican spotted owl, or yellow-billed cuckoo, or cactus ferruginous pygmy-owl populations. Most areas where visitation might increase because of new or improved trailheads or trails or visitor center expansion would not be in areas known to be frequented by these populations.

Alternative 3 would not be likely to adversely affect lesser long-nosed bat, Mexican spotted owl, yellow-billed cuckoo, or cactus ferruginous pygmy-owl habitat in the area. Facilities that would be developed in the Tucson Mountain District and the lower elevations of the Rincon Mountain District would be in or near potential cactus ferruginous pygmy-owl and lesser long-nosed bat habitat, but the facilities and people in these areas would not necessarily keep cactus ferruginous pygmy-owls and lesser long-nosed bats from dispersing into and using the areas. The cactus ferruginous pygmy-owl is active mostly during daylight hours. The presence of people could discourage nesting and feeding activities in high use areas. However, cactus ferruginous pygmy-owls have not been confirmed to be within the park since 1995. The chance of encounters with people would be greater than alternative 2 because the management focus would be on improving visitor access and the variety of recreational opportunities. Optimal habitat is abundant in the park, and the small amount that would be disturbed due to facility improvements or visitation would leave the owls plenty of acreage to nest and feed with minimal disturbance. The bats, which are mostly nocturnal, would be in the areas when few people were present.

The removal of support facilities at Manning Camp would have a long-term minor beneficial impact on Mexican spotted owls. The reduction of human presence and disturbance would allow the owls opportunity to resume using the habitat at Manning Camp. The removal operation might have a temporary effect on the owls due to the increased activity; however, the removal operations should not have an adverse effect because the owls currently avoid this area. The spike camps would not likely adversely affect the owls because the camps would be temporary and would not be placed near known populations.

Yellow-billed cuckoo habitat is primarily riparian areas. The increased staffing presence due to the visitor contact station and science station at Madrona would provide a beneficial affect by providing interpretation and information on resource protection. The continued protection of the Madrona and Rincon Creek area with low visitation levels would continue to provide habitat for transient and breeding cuckoos.

Cumulative Effects. Although residential and commercial development activities would continue to reduce yellow-billed cuckoo, lesser long-nosed bat, and cactus ferruginous pygmy-owl habitat, independent of alternative 3, it is unlikely that such efforts would be permitted in areas where they are known to occur. Pima County does have a *Sonoran Desert Conservation Plan* to guide development and protect key habitats. Assuming future developments follow this plan, effects on threatened and endangered species should be minimized. However, if the zoning is changed so that it no longer follows the conservation plan recommendations, the long-term impacts would be adverse and major.

The Gila topminnow is proposed to be reintroduced to the park by the U.S. Fish and Wildlife Service when habitat conditions support reintroduction. This would have a potential beneficial effect on the topminnow populations if efforts were successful.

The Cienega Conservation Corridor is being managed by a partnership composed of private, nonprofit, and governmental partners. Potentially connecting to the Las Cienegas National Conservation Area, would allow this riparian corridor to continue with traditional recreational and ranching uses. This would have a long-term beneficial effect on special status species. Maintaining the biological corridor connecting the mountain ranges would ensure that a variety of riparian and desert habitats remain available.

Overall, the impacts of other actions described above, in combination with the impacts of alternative 3, would cumulatively affect but not likely adversely affect the lesser long-nosed bat, cactus ferruginous pygmy-owl, Mexican spotted owl, yellow-billed cuckoo, Gila topminnow, or cactus ferruginous pygmy-owl. Alternative 3's contribution to these cumulative effects would be relatively small.

Conclusion. Before taking any action in alternative 3 that might affect federally listed species in the park, the National Park Service would consult with the U.S. Fish and Wildlife Service to ensure that potential impacts were identified and avoided. There is habitat for the cactus ferruginous pygmy-owl in the park. However, actions proposed in alternative 3 would not be likely to adversely affect the populations of lesser long-nosed bat, Mexican spotted owl, yellow-billed cuckoo, Gila topminnow, or cactus ferruginous pygmy-owl in Saguaro National Park.

Alternative 3 plus other actions may affect but would not be likely to adversely cumulatively affect Mexican spotted owls, yellow-billed cuckoos, Gila topminnows, lesser long-nosed bats, or cactus ferruginous pygmy-owls. Alternative 3's contribution to these cumulative effects would be relatively small. No impairment of park resources or values would result from this the alternative.

Soils/Geologic Resources

The management zones promote the alternative's emphasis of providing a wider range of opportunities for visitors while protecting the park's resources. This alternative has the highest percentage of natural zone. The natural zone allows for the potential of the most types of uses such as higher trail densities, paved trails, bicycling, and stock use. Higher levels of development are allowed in the natural zone, which can lead to increased impacts on soils due to compaction and erosion. Most of the park is zoned primitive and semi-primitive because these zones promote wilderness qualities necessary in designated wilderness. These zones restrict the level of development and recommend lower levels of visitation to maintain pristine and excellent natural resource conditions. Overall, the combination of zones in this alternative should be less likely to have long-term adverse impacts to threatened and endangered species in the park than the no-action alternative.

Analysis. The installation of traffic-calming devices could result in short-term adverse impacts on soils during construction. The devices could include curb and guttering, roundabouts, and road signs. The equipment needed to install the devices would need to be placed near the road. If the staging area was on an unimproved surface, the equipment could increase soil compaction and erosion. Mitigative measures would include placing equipment in previously disturbed areas. The installation of these devices would have short-term, negligible adverse impacts on soils.

Trail realignments would have an overall beneficial impact on soils because the new alignments would be located in areas with soil qualities that would minimize erosion potential. This would result in a minor long-term beneficial impact. However, soil compaction due to foot, bicycle, and/or stock traffic might increase in previously undisturbed areas where the realignments are

located. The realigned trails would be located where soil compaction is minimized; thus a negligible long-term adverse impact would occur. Overall, trail realignments should have a long-term minor beneficial impact on park soils.

The creation of new trails would result in new disturbance to soils and the potential for increased erosion. Mitigative measures would include locating trails on soils with low erosion hazards, small changes in slope, and proper signs to minimize social trails.

Trailhead improvements could result in a permanent loss and disturbance of soils if associated parking lots are built or expanded, and even with mitigative measures, some soil would be lost to erosion. The short-term adverse impacts would be minor. If people parked their vehicles along the side of the road, it could cause a secondary adverse effect on soils. This could result in a minor long-term adverse impact on soils along the roads near trailheads.

The Rincon Mountain District visitor center and parking area expansion, Madrona science center, and Madrona visitor contact station would have adverse impacts on soils. Construction would increase the amount of impervious area within the park resulting in increased potential for erosion around the structures during rain storms that create runoff. Mitigative measures such as proper drainage and designing the parking area to be a retention area would reduce the impacts. With mitigation, the long-term adverse impacts would be minor.

The soils in Saguaro National Park also would be adversely affected by several other actions in alternative 3. Park soils would be affected by constructing or improving park facilities, including improving staff offices and adaptation of structures from life estates for administrative use. Most of these developments would be in areas where the soils have been altered by past activities. Although some soils in these areas could be altered and erosion increased by construction, with mitigation the local adverse effects on soils in most areas would be minor, short term, and localized.

Increased visitation could have an adverse impact on soils. Larger numbers of people on park trails could increase soil compaction and the rate of erosion. Properly locating new trails, regular maintenance, and monitoring for damage would mitigate these effects. A long-term moderate adverse impact on soils could result due to increased visitation.

Overall, actions in alternative 3 would have short-term minor and long-term moderate adverse impacts on localized portions of the park's soils.

Cumulative Effects. The rehabilitation of Cactus Forest Loop Drive had a short-term adverse impact on soils due to increased impervious area. Long-term negligible beneficial impacts were created due to restoration of most of the compacted soils.

Outside the park, development in the Houghton area, Rincon/Southeast Subregional area, and Tucson Mountain Subregional area surrounding the park would continue to alter the soils surrounding the park. The construction of additional residential and commercial developments in open space between existing public lands would further increase the amount of impervious area. Pima County has adopted the *Sonoran Desert Conservation Plan* and changed their land use zoning accordingly, which may reduce some impacts associated with continued development outside the park. The development in the region would have a moderate long-term adverse impact on soils. However, if the zoning is changed so that it no longer follows the conservation plan recommendations, the long-term impacts would be adverse and major.

The Cienega Conservation Corridor is being managed by a partnership composed of private, nonprofit, and governmental partners. Potentially connecting to the Las Cienegas National Conservation Area would allow this riparian corridor to continue with traditional recreational and ranching uses, which would have a long-term beneficial effect on soils in the region. Reducing the amount of development occurring in this corridor would minimize the impacts associated with expansion of Tucson. This action would have a long-term, minor beneficial impact on soils in the region.

The creation of the Ironwood Forest National Monument west of Tucson increased the level of protection on approximately 190,000 acres, almost 130,000 acres of which is federal property. Development in the national monument should be limited. This action would have a long-term, minor beneficial impact on soils in the region.

Overall, the impacts of other actions described above, in combination with the impacts of alternative 3, would have moderate long-term cumulative impacts on soils in the region. The contribution of alternative 3 to these cumulative impacts would be relatively small.

Conclusion. Most of the park's soils would not be affected by alternative 3. Overall, actions in alternative 2 would have short-term minor and long-term moderate adverse impact on localized portions of the park's soils. When outside developments are added to new park developments, improvements, and increased use in parts of the park under alternative 3, the cumulative result would be a moderate long-term adverse effect on area soils. The contribution of alternative 3 to these cumulative impacts would be relatively small. The effects on soils from alternative 3 would not constitute an impairment of park resources or values.

Soundscapes

The management zones promote the alternative's emphasis of providing a wider range of opportunities for visitors while protecting the park's resources. This alternative has the highest percentage of natural zone. The natural zone allows for the potential of the most types of uses such as higher trail densities, paved trails, bicycling, and stock use. Higher levels of development are allowed in the natural zone. Higher densities of visitors partaking in a greater number of types of activities potentially will lead to greater sound levels associated with human use. However, the natural zone areas have been located to minimize impacts on the soundscape. Most of the park is zoned primitive and semi-primitive because these zones promote wilderness qualities necessary in designated wilderness. These zones restrict the level of development and recommend lower levels of visitation to maintain pristine and excellent natural resource conditions. Overall, the combination of zones in this alternative should be less likely to have long-term adverse impacts on the soundscape in the park than the no-action alternative.

Analysis. Traffic calming devices and other facility improvement projects in alternative 3 would affect the park's soundscape in local areas. Construction workers and equipment would generate noise during the construction or improvement of trails and parking areas, Rincon Mountain District visitor center expansion, rehabilitation of existing buildings, and road improvements. In some of these areas, the noise from construction equipment would be substantial, but it would be temporary and local and would take place at different times and places in the park. Most noise from projects proposed in this alternative would be in or near developed areas that are exposed to noise from vehicles, park equipment, and visitors. Depending on the presence of other facilities (such as the expanded visitor center and parking) and people, vegetation, wind, and time of day,

noise from the construction activities would have minor short-term adverse impacts on the natural soundscape in localized areas.

Noise levels would be likely to decrease under alternative 3 in places that have been relatively loud in the past. Traffic calming on Picture Rocks Road should reduce vehicle speeds, resulting in lower engine noise being emitted. Slower, smoother vehicle speeds would reduce the road noise heard in wilderness areas surrounding Picture Rocks Road. These actions would result in a long-term negligible beneficial impact.

If necessary, the park would use the next level of traffic-calming strategies to meet the park's goals for visitor experience and/or biological protection, (i.e., installing speed bumps, fee kiosks, or a combination of the two). Slowing traffic more would further reduce noise intrusions into the park from vehicles. If these strategies still do not enable the park to meet their goals, the final step would be to work with Pima County to find alternative routes around the park. See the explanation of adaptive management on page 50.

Improvements at trailheads could cause localized long-term increases in noise due to a potential increase in the numbers of visitors using the trailheads and associated trails. This would result in a long-term, localized minor adverse affect on the soundscape because visitors would not stay long in one area.

During the construction of improvements such as expanded parking areas and the Rincon Mountain District visitor center expansion, the short-term impacts would be minor and adverse due to noise from construction equipment, vehicles, and workers. The improvements would be spread throughout the park and over time and the effects would be localized.

Overall, implementing alternative 3 would have localized, minor short-term and negligible long-term adverse impacts on the soundscape.

Cumulative Effects. As in the no-action alternative and alternative 2, noise in parts of the park would temporarily increase from construction activities, the operation of machinery and vehicles, and the presence of workers. At different times, short-term minor adverse effects from noise would be caused by park construction machinery, for example the recent repaving of the Cactus Forest Loop and the paving of the Bajada Loop Drive and Golden Gate Road.

Outside the park, the construction of the Twin Peaks Interchange could cause temporary increased commuter traffic on through park roads in the Tucson Mountain District, which would increase noise associated with vehicles within the park. Over the long term according to the Pima Association of Governments, Picture Rocks Road traffic volume would increase due to the increased population on the west side of the park. This would be an unknown long-term beneficial impact because it is not known how many travelers on Picture Rocks Road would choose to use this new interchange.

Commercial and military aircraft would continue to regularly fly over the park generating noise intrusions in both units. Aircraft would continue to have a short-term moderate adverse impact on the soundscape during the actual flyover, and a long-term minor adverse impact because the number of flyovers should continue to be relatively small.

Overall, these effects added to noise caused by actions proposed in alternative 3, would result in short-term moderate and long-term minor cumulative adverse noise effects that are mostly in localized areas. Alternative 3's contribution to these impacts would be relatively small.

Conclusion. The soundscape in most of Saguaro National Park would continue to be

relatively quiet under alternative 3. There would be more sources of noise in the park than in alternative 2 because Golden Gate Road would remain open to vehicular traffic. The construction of traffic-calming devices on through-park roads, Rincon Mountain District visitor center and parking lot expansion, and other improvement projects would cause short-term minor adverse effects on the soundscape, mostly in areas already exposed to some noise. The long-term adverse affects would be negligible.

The adverse cumulative effects on the soundscape would be moderate in the short term and minor over the long term. Alternative 3's contribution to these impacts would be relatively small. Park's resources and values would not be impaired by any of the proposed actions in alternative 3.

CULTURAL RESOURCES

Archeological Resources

Analysis. Archeological resources adjacent to or easily accessible to visitors from trails, roads, and picnic areas, and from designated backcountry campgrounds in the Rincon Mountain District, would continue to be vulnerable to surface disturbance, inadvertent damage, and vandalism. Deterioration of cultural remains could result by way of a loss of surface archeological materials, alteration of artifact distribution, or a reduction of contextual evidence. However, increased ranger patrolling and emphasis on visitor education would discourage vandalism and inadvertent destruction of cultural remains, and any adverse impacts would be expected to be minimal if any.

As appropriate, additional archeological surveys would precede any ground disturbance associated with excavation or construction. Ground disturbances would include development of new staff housing in the Madrona area; expansion of the Rincon Mountain District visitor center; construction of an environmental education center near the Camino Loma Alta trailhead; adaptive reuse of park housing as an education center; and any ground disturbances associated with trail maintenance, the closure and revegetation of social trails, and the construction of new trails and trailhead parking areas. National-register-eligible or -listed archeological resources would be avoided to the greatest extent possible, and no adverse effects would be anticipated. If such resources could not be avoided, an appropriate mitigation strategy would be developed in consultation with the Arizona state historic preservation officer and the traditionally associated tribes.

Before the removal or razing of the Civilian Aeronautical Administration building in the Madrona area of the Rincon Mountain District, a survey for archeological resources in the general vicinity of the affected structure would be designed and conducted in consultation with the Arizona state historic preservation officer. The excavation, recordation, and mapping of any significant cultural remains would be completed before removal or razing of the building, to ensure that important archeological data that otherwise would be lost is recovered and documented.

Cumulative Impacts. Past development in the park such as trails, roads, housing, visitor centers, Manning Cabin, the later tent-platform camping at Manning Camp for trail workers and fire fighters, and the 1933-1941 construction of frame and adobe structures and rustic stone picnic facilities by the Civilian Conservation Corps may have resulted in the disturbance. There could have been loss of some archeological resources during excavation and construction activities, adversely impacting archeological resources.

In addition, agricultural, ranching, and mining practices; the development of the historic town of Tucson and current city thereof with its rapidly growing population and associated new residential areas and industrial parks, such as the University of Arizona Science and

Technology Park, including the metropolitan and surrounding regional development of pedestrian walkways and hiking trails and routes and trails for bicycles on municipal and county lands and those of other federal agencies may also have adversely impacted archeological resources. Some of these types of activities continue, such as the growth and expansion of residential areas impinging upon Saguaro National Park, and could also result in future adverse impacts to archeological resources.

As described above, the impacts associated with implementing alternative 3 would be either adverse because avoidance could not be achieved and mitigation invoked or would result in no adverse effects on the park's archeological resources because avoidance could be achieved. Accordingly, the actions associated with alternative 3 could contribute both adverse and no adverse impacts to any cumulative impact. However, because avoidance would be sought, no generally adverse impacts would be associated with alternative 3. Any adverse impacts would be a very small component of the adverse cumulative impact associated with other past, present, and reasonably foreseeable actions both within and outside the park.

Conclusion. Avoidance of National Register listed or eligible archeological resources during the ground disturbances of trail and building construction would result in no adverse impacts to these resources. In the event disturbance of such archeological resources could not be avoided, a memorandum of agreement, in accordance with 36 CFR Part 800.6, *Resolution of Adverse Effects*, would be negotiated between Saguaro National Park and the Arizona state historic preservation officer (and/or the Advisory Council on Historic Preservation, if necessary). The memorandum of agreement would stipulate how the adverse effects would be mitigated.

Alternative 3 would contribute no adverse impacts to the adverse impacts of other past, present, and reasonably foreseeable actions occurring both within and outside the national park. However, the overall cumulative impact would remain adverse.

Any adverse impacts of implementing alternative 3 would be a very small component of the adverse cumulative impacts associated with actions by others both within and outside the national park.

Because there would be no adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Saguaro National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Cultural Landscapes

Analysis. Under alternative 3, revegetation of social trails would continue. No adverse effects would be associated with revegetation of social trails because such rehabilitation would have a beneficial impact upon potential cultural landscapes by returning them to more of a semblance of their historic appearances in the natural setting of the Sonoran Desert. As settings for continuity or change, the desert and mountainous areas of Saguaro National Park are important character-defining features of the various potential cultural landscapes suggested in the cultural affected environment section of this document. Under alternative 3, revegetation of social trails would continue, which would result in long-term minor to moderate beneficial effects on cultural landscapes.

Before constructing any facilities or trail changes, cultural landscape inventories would be conducted to identify, document, analyze and evaluate cultural landscape characteris-

tics. Such inventories would ensure that character-defining features such as topography, vegetation, circulation, spatial organization, land use, natural systems and elements, historic structures, and small-scale elements would not be affected or that the effects would be minimal. There would be no adverse effect on potential cultural landscapes.

Before the demolition of any structures that might be associated with a potential cultural landscape, the structures would be evaluated to determine if they are contributing elements to a national-register-eligible cultural landscape. If removal would occur of a structure that is a contributing element to a national-register-eligible cultural landscape, appropriate documentation recording the structure would be prepared. This would be in accordance with Section 110 (b) of the National Historic Preservation Act of 1966, as amended. Submittal of the documentation would be to the NPS Historic American Buildings Survey / Historic American Engineering Record / Historic American Landscapes Survey (HABS/HAER/HALS) program.

Cumulative Impacts. Past development in the park — such as mining and lime-making activities, trails, roads, housing, visitor centers, Manning Cabin, the later tent-platform camping at Manning Camp for trail workers and fire fighters, and the 1933-1941 construction of frame and adobe structures and rustic stone picnic facilities by the Civilian Conservation Corps — has resulted in the creation of historic cultural landscapes. With cessation of original land uses, certain structures, such as the lime kilns, have deteriorated.

Prehistoric and historic human occupation and habitation including agricultural, ranching, and mining practices; the development of the historic town of Tucson and the current residential and industrial spread of the city have contributed to the history and current conditions of the potential cultural landscapes referred to the cultural affected environment section of this document. Some of these types of activities continue, such as the growth and expansion of residential areas impinging upon Saguaro National Park, and could result in future adverse impacts to cultural landscapes.

The recent rehabilitation of Cactus Forest Drive was done in accordance with the 1995 *Secretary of the Interior's Standards for the Treatment of Historic Properties,* and there would be no adverse effect.

As described above, the impacts associated with implementing alternative 3 would result in predominantly no adverse effects on the park's potential cultural landscapes. However, the few potential adverse impacts associated with alternative 3, in combination with the adverse impacts of other past, present, and reasonably foreseeable future actions, both within and outside the park, would result in an adverse cumulative impact. The adverse impacts of alternative 3 would only contribute minimally to the adverse cumulative impact.

Conclusion. No adverse effects would be associated with revegetation of social trails because such rehabilitation would have a beneficial impact upon potential cultural landscapes by returning them to more of a semblance of their historic appearances in the natural setting of the Sonoran Desert.

A site-specific study would take place if any potential cultural landscapes were to be affected by proposed actions of alternative 3, including national-register-listed or -eligible cultural landscapes, during trail and building construction activities; thus there would be no adverse impacts on these resources. In the event of disturbance of such cultural landscapes could not be avoided, a memorandum of agreement, in accordance with 36 CFR Part 800.6, *Resolution of Adverse Effects*, would be negotiated between Saguaro National Park and the Arizona state historic preservation

officer (and/or the Advisory Council on Historic Preservation, if necessary). The memorandum of agreement would stipulate how the adverse effects would be mitigated.

The few potential adverse impacts associated with alternative 3, in combination with the adverse impacts of actions by others, both within and outside the park, would result in an adverse cumulative impact; implementing alternative 3 would only contribute minimally to this adverse cumulative impact.

Because there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Saguaro National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Ethnographic Resources

Analysis. Management actions concerning ethnographic resources under alternative 3 would be the same as under alternative 2, the preferred alternative. They would include placing Sandario and Kinney Roads in the Sightseeing Corridor Management Zone. Since that zone promotes a leisurely, unhurried, educational, pleasant and safe experience for visitors traveling along park corridors, the road conditions adjacent to and in the vicinity of the area the Tohono O'odham use to gather saguaro fruit would be improved. The improvements would mean a moderate, beneficial, and long-term impact on the area as an ethnographic resource. Such reductions would benefit the gathering of saguaro fruit by increasing the area's tranquility and making it more suitable for traditional use. The sightseeing-zoning proposal would only better accommodate the Tohono O'odham traditional practice of gathering saguaro fruit.

Cumulative Impacts. The past park practice of allowing saguaro-fruit harvesting by the Tohono O'odham in the park's Tucson Mountain District would help support the practice of gathering saguaro fruit in the region (on the Tohono O'odham reservation), thus helping to perpetuate Tohono O'odham culture. This situation would mean a beneficial, moderate, long-term impact on saguaro-fruit harvesting as an ethnographic resource.

As described above, the impacts associated with implementation of alternative 3 are beneficial, moderate long-term impacts on the park's ethnographic resources. Accordingly, the actions associated with alternative 3 would contribute beneficial impacts to any cumulative impact. The beneficial impacts of implementing alternative 3, however, would be very small components of the minor, beneficial, and long-term cumulative impact associated with other past, present, and reasonably foreseeable actions both within and outside the park.

Conclusion. Alternative 3 would impact beneficially and moderately for a long-term period the harvesting of saguaro fruit in the park's Tucson Mountain District. There would be no adverse effect on the area as a potential traditional cultural property.

Implementing alternative 3 would contribute only beneficially to the impacts of other past, present, and reasonably foreseeable actions occurring both within and outside the park. The moderate long-term cumulative effect would be beneficial, and implementation of alternative 3 would be a small contribution to the overall beneficial cumulative effect in the region.

The beneficial impacts of implementing alternative 3 would be very small components of the minor, beneficial, and long-term

cumulative impact associated with actions by others both within and outside the national park.

Because road conditions involving an important ethnographic resource would be improved, there would be no adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Saguaro National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

Historic Structures

Analysis. To appropriately preserve and protect national register listed or eligible historic structures, all stabilization, preservation and rehabilitation efforts, as well as daily, cyclical, and seasonal maintenance, would be undertaken in accordance with the 1995 *Secretary of the Interior's Standards for the Treatment of Historic Properties*. Stabilization, preservation, and rehabilitation would have no adverse effects upon historic structures and cultural landscapes. Sixty-five structures are entered in the park's NPS List of Classified Structures, which means that these entries are either listed in the National Register of Historic Places or eligible for listing. They would be managed for historic preservation and would be in accord with the Cultural Resources Parkwide Management Zone, which is defined elsewhere in this document. This List of Classified Structures is given in appendix H.

Civilian Aeronautical Administration (CAA) Building at Madrona. The donation of the historic Civilian Aeronautical Administration building in the Madrona Area of the Rincon Mountain District to a willing taker for relocation out of the park would have an adverse effect because of its long association with the park. Razing the building would also be an adverse impact because the building would be destroyed.

Mitigation of the adverse effect of relocating or razing under Section 106 of the National Historic Preservation Act would be through documentation and recordation and consultation and concurrence with the Arizona state historic preservation officer for documentation.

Manning Cabin and Manning Dam at Manning Camp. Because the fire crew and trail crew support facilities would be moved away from Manning Camp to a new off-site administration area under alternative 3, there would be less general wear and tear to the historic fabric of Manning Cabin. That would be beneficial with no adverse effect. This conclusion is based upon findings of the recent report "Condition Assessment, Evaluation and Recommendations for Repair and Preservation, Manning Cabin at Manning Camp" (NPS 2005a). There would be no change regarding Manning Dam and no adverse effect.

Cumulative Impacts. Over the years, historic structures in the park, such as remnant lime kilns, adobe and other remains of Camp Pima, and the scant remains of the Freeman Homestead, have been adversely impacted by the wear and tear associated with visitation and by natural processes like weathering. Also, change has occurred among the CCC stone picnic structures, so much so that "the only structures that have survived in their original appearance are the bathrooms" (NPS 1987a:225). Historic fabric in the form of adobe and brick houses associated with the settlement and subsequent growth of Tucson has been lost in the region, which is an adverse effect. Related to these houses, lime "for use as mortar or whitewash" (National Park Service 1987a:112) came from the lime kilns in what is now the park. Historic fabric has been lost because of settlement, mining, and

ranching and because of the spread of urban population growth and modernization.

As a historic structure Cactus Forest Drive would continue to be preserved by maintaining its naturalistic and rustic Civilian Conservation Corps road design. This design fits in with the physical setting to accommodate scenic views and to show natural features to their best advantage like stands of native cacti. Distinctive construction features such as retaining walls and guard walls and culverts of native stone would continue to be rehabilitated for historic preservation in accordance with the secretary's standards. There would be no adverse effect per Section 106 of the National Historic Preservation Act from continuing these actions.

As described above, the impacts associated with implementing alternative 3 would be both not adverse and adverse on the park's historic structures. Accordingly, the actions associated with alternative 3 would contribute both no adverse and adverse impacts to any cumulative impact. The adverse impacts of implementing alternative 3, however, would be very small components of the adverse cumulative impact associated with other past, present, and reasonably foreseeable actions both within and outside the park.

Conclusion. There would be an adverse effect concerning relocating or razing the CAA building, and there would be no adverse effect with the moving away of the fire management and trail maintenance support facilities on the historic fabric of Manning Cabin at Manning Camp. There would be no change regarding Manning Dam and no adverse effect.

The adverse impacts of implementing alternative 3 would be very small components of the adverse cumulative impact associated with actions by others both within and outside the national park.

Because there would be no adverse impacts on a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation of Saguaro National Park; (2) key to the natural or cultural integrity of the park or to opportunities for enjoyment of the park; or (3) identified as a goal in the park's general management plan or other relevant NPS planning documents, there would be no impairment of the park's resources or values.

VISITOR EXPERIENCE

Range of Recreational Opportunities

In alternative 3, both park districts would be zoned with a mixture of primitive, semi-primitive and natural zones, providing a larger range of recreational opportunities than alternatives 1 and 2, particularly around the existing developed areas of the park. The higher degree of semi-primitive and natural zoning would provide more diverse trail opportunities.

Similar to Alternative 2, Alternative 3 would include a variety of traffic calming strategies for the park's thru-park roads, which would improve auto touring opportunities along these routes. These are highly scenic roads that can provide extensive touring opportunities if conditions are improved with traffic-calming strategies. There may be a slight inconvenience to auto touring visitors related to some of the initial proposed traffic calming strategies such as delays at trail crossings, visual intrusions of speed display signs, and slow downs related to increased speed enforcement. However, it is expected that the benefits to opportunities for auto touring from the traffic calming greatly outweigh the negative impacts, leading to a long-term moderate beneficial impact to visitors. If additional traffic-calming strategies are needed, such as entrance gates, to meet desired conditions on the roadways, visitors may experience a higher level of inconvenience. It is still expected that the benefits resulting from the traffic calming

would outweigh the negative impacts on visitors' recreation opportunities.

Also related to improving auto-touring opportunities would be the paving, narrowing, and making a one-way loop configuration for the scenic Bajada Loop Drive that is proposed in this alternative. This modification to the road would improve scenic driving opportunities by reducing encounters between motorists, cyclists, and walkers because all users would travel in the same direction. This would lead to less crowding and safety conflicts on the road. In addition, by traveling only in a clockwise direction around the loop, the need to make a dangerous left turn from the scenic Bajada Loop Drive onto Sandario Road would be eliminated. Further, paving the loop would allow use of the road by a wider array of visitors. All of these benefits related to changes on scenic Bajada Loop Drive would be considered a long-term moderate beneficial impact on the range of recreational opportunities, including scenic driving opportunities.

In this alternative, Golden Gate Road would be left as a motorized route, continuing to provide scenic motorized touring through the park. Leaving Golden Gate open for motorized vehicles would compliment the improved scenic touring along Picture Rocks Road. Visitors would be able to travel from Kinney and Sandario Roads, through the park and onto Picture Rocks Road, for a leisurely scenic drive. Keeping Golden Gate Road open to motorized vehicles would be important to this scenic tour opportunity, resulting in a long-term minor beneficial impact for visitors.

Further, alternative 3 proposes additional camping opportunities in the Rincon Mountain District as needed to accommodate new trail connections to and through the park's wilderness area — a long-term minor beneficial impact.

The comprehensive trails plan would have a long-term major beneficial impact on all trail opportunities in the park. The plan would seek to determine how the park would achieve the desired conditions in the general management plan's management zones including improving trail conditions, alleviating user conflicts and providing a high quality trail system that meets the needs of a diverse user population. In addition, the trails plan will be developed with stakeholders input and provide rationale for any needed adjustments to the park's current trail system. Specifically in this alternative, the trail plan will explore opportunities for the following:

Tucson Mountain District
- Opportunities for developing bicycling trails would be explored along the gas pipeline right-of-way near the eastern boundary of the district.
- Opportunities for trails for visitors with disabilities would be explored in the CCC camp area.

Rincon Mountain District
- Biking opportunities would be explored along the Hope Camp Trail.
- The Camino Loma Alta trailhead would be improved.
- The Douglas Springs, Wildhorse, and Broadway trailheads would be redesigned/improved.
- Development of additional ADA-accessible trails would be explored.

Trails in Both Districts
- Regional trail connections would be explored in conjunction with partners. The location of regional trail connections would be identified as part of the comprehensive trails plan.
- The location of trail access points and possible trailheads would be identified.
- The need for single-use trails to reduce trail user conflicts would be assessed as part of the comprehensive trails plan.
- The need for trail realignments to protect resources would be evaluated.

All of these proposed actions were raised as proposals for improving the park's trail systems during the public scoping process for the GMP. Providing additional wheelchair accessible trails and nature trails in a few key locations would increase the range of recreational opportunities in the park, and provide more opportunities to a wider population. These improvements would be considered a long term moderate beneficial impact. Redesigning and improving trailheads to reduce user conflicts, resource impacts and to address visitor safety concerns would improve existing recreational opportunities by facilitating access to the park's diverse trail system, a long term moderate beneficial impact. Providing single use trails may help reduce user conflicts, enhancing existing recreational opportunities — a long term moderate beneficial impact.

Increasing bicycling opportunities, particularly the connection of regional bike trails, was highly desired by many respondents during public scoping for the GMP. An increase in bicycle trails would be a long term moderate beneficial impact for visitors interested in this type of recreational opportunity. However, the increase in bicycling opportunities may be met with some concern by visitors that feel bicycling use should not be expanded in the park due to perceived user conflicts and resource damage. More opportunities for bicycle trails would be explored in this alternative compared to alternative 2, but the trails would still be limited to the peripheral areas of the park, so this is not expected to be more than a long-term minor adverse impact on visitors' that would prefer bicycling to be limited to the status quo.

In this alternative, off-trail travel would continue in the Tucson Mountain District, resulting in a long-term minor beneficial impact for the range of recreational opportunities.

In the short term, any construction might result in negligible impacts on the visitor experience because of noise, temporarily restricted access, and visual intrusions.

Opportunities for Solitude and Getting in Touch with Nature

Alternative 3 has the largest area of natural and semi-primitive zones, which allows for a more diverse range of uses and higher levels of use that could result in more encounter rates and a higher degree of user conflicts in comparison to the zoning scheme in alternative 2. Opportunities for solitude and getting in touch with nature were considered some of the most important values of the park to respondents during the GMP scoping process. Although the zoning scheme in alternative 3 should largely protect these values, there is a chance of minor impacts to these values with higher amounts of the natural and semi-primitive zone.

Similar to alternative 2, this alternative has some specific strategies that would aid the park in preserving the values of solitude and getting in touch with nature including the exploration of single use trails in the comprehensive trails plan. The potential reduction in encounters between different types of user groups can eliminate real and perceived user conflicts which often detract from visitors' sense of solitude and contemplation. This would be a long-term minor beneficial effect.

The fire and trail support facilities at Manning Camp would be moved away from Manning Camp to a new off-site location. Temporary spike camps would be used by trail and fire crews as needed when working in the backcountry. The reduction of administrative activities as Manning Camp would reduce the visual and sound impacts that intrude on visitor's opportunities for solitude and getting in touch with nature. However, the increased need for spike camps to support trail and fire activities may occasionally impact solitude opportunities along the backcountry trail system. It is likely that the change in

operations and support facilities at Manning Camp would be a long term minor beneficial impact on visitor's opportunities for solitude and getting in touch with nature.

In the short term, any construction might result in negligible impacts on the visitor experience because of noise, temporarily restricted access, and visual intrusions.

Visitor Access including Access for Visitors with Disabilities

Several issues related to visitor access would also be resolved in this alternative. Traffic calming on through-park roads would likely improve access opportunities to the Tucson Mountain District. Currently, the National Park Service does not encourage visitors to use Picture Rocks Road to access the park due to the safety and visitor experience impacts caused by the conflicts with commuting traffic. If some of these impacts are mitigated with the traffic calming strategies, then use of Picture Rocks Road by visitors to access the park would be encouraged and would likely increase. Improving access via Picture Rocks Road would be a long-term moderate beneficial impact.

This alternative would provide the highest level of access to the Madrona/Chimenea area, while still protecting the sensitive natural and cultural resources. It is likely that the Arizona State Trail will connect to the south boundary of the Rincon Mountain District, providing trail access in closer proximity to the Madrona/Chimenea area, which could increase visitation. Due to this potential increase in visitation, there would be a visitor contact station built at the Madrona/ Chimenea area with daily ranger presence to help manage visitor use. In addition, this area would be a focus of systematic monitoring as part of the park's user capacity and biological monitoring programs. The park would implement new management strategies if visitor use impacts indicate that further regulation on use levels was needed. Closer access to Madrona would be considered a long-term minor beneficial impact. The preservation of the highly valued qualities of the area including its pristine resources and contemplative setting through the presence of park staff at the visitor contact station and the park's visitor use monitoring program would be considered a long-term major beneficial impact.

This alternative would expand regional trail connections in conjunction with partners. The location of regional trail access points and possible trailheads would be identified during the trail planning process. Making key connections of already planned and developed regional trails was of strong interest to several stakeholders and many scoping respondents. These trail connections would greatly expand the connectivity of public lands in the region and provide more diverse recreation opportunities for local residents. This would be considered a long-term moderate beneficial impact to people interested in these regional trail connections.

Further, this alternative proposes trailhead improvements at Camino Loma Alta, and Broadway, Douglas Springs and Kings Canyon. The details of the trailhead improvements would be included in the comprehensive trails plan. At Camino Loma Alta the emphasis would be on formalizing parking with associated amenities for multiple user groups to access the Hope Camp area of the Rincon Mountain District. The improvements at Camino Loma Alta would be on a larger scale in this alternative than in alternative 2 to provide even more access to this area of the park. In association with improved bicycling opportunities, the trailhead improvements would be a long-term moderate beneficial impact.

The natural zones inside both loop roads, east of Sandario Road and south of Kinney Road, and near the proposed partnership education center would be considered for the

development of new accessible paved nature trails. Many respondents noted interest and support for more trail opportunities for disabled visitors, as well as new nature trail opportunities for all visitors. These proposed trails would be a long-term minor beneficial impact for visitors interested in these types of trail experiences.

In the short term, any construction might result in negligible impacts on the visitor experience because of noise, temporarily restricted access, and visual intrusions.

Opportunities for Orientation, Education and Interpretation

In Alternative 3, the Rincon Mountain District visitor center would be expanded to provide additional exhibit space, which was supported by numerous respondents during public scoping. The Rincon Mountain District visitor center is small for the amount of use it receives and the exhibits are outdated. Most visitors do not spend much time in the visitor center and it currently is the main source of information and interaction with park staff for this unit. Improving the center to be on par with the services and media available at the Tucson Mountain District visitor center would be a long-term moderate beneficial impact to opportunities for orientation and education for Rincon Mountain District visitors.

Further, this alternative proposes an education center to be developed at the south boundary of the Rincon Mountain District as partners and funding become available. An existing life-lease structure in the Rincon Mountain District is another facility for potential adaptive reuse as an education center when the property is released to the National Park Service. Further, if headquarters were moved off-site, the existing building could be used as an education center. These expansion or reuse of any of these facilities for education centers would greatly increase organized group programming opportunities and educational services for the park, which would be a long-term moderate beneficial impact for park visitors and the local community.

The visitor contact station at Madrona/ Chimenea would also expand the orientation, interpretation and educational opportunities available at the park, leading to a long-term minor beneficial impact for visitors.

In the short term, any construction might result in negligible impacts on the visitor experience because of noise, temporarily restricted access, and visual intrusions.

Visitor Safety

There have been 155 accidents (3 fatalities and 42 injuries) on Picture Rocks Road and 95 accidents (1 fatality and 40 injuries) on Sandario Road between 1998 and 2005 (Saguaro National Park, Chief Ranger, pers. comm. with Kerri Cahill, NPS Denver Service Center, 7/2006). In addition to actual safety conflicts, there is a high level of perceived safety conflicts on the road due to high volumes and speeds of traffic during commuting hours. Many respondents commented on their concerns of safety along the through-park roads, particularly Picture Rocks Road. Many respondents asked that the NPS make safety improvements to the roadways. The traffic calming strategies suggested in this alternative would be expected to reduce the number and severity of vehicle accidents along the roads, particularly Picture Rocks Road, which would be a long-term moderate beneficial impact on Tucson Mountain District visitors.

The expansion and improvements of the Rincon Mountain District visitor center would also improve the distribution visitor safety information, leading to a long-term minor beneficial impact.

Cumulative Effects

Several recent or proposed projects in the region may contribute to cumulative impacts on the visitor experience at both districts. Regarding the range of recreational opportunities, The Pima Association of Governments *2030 Transportation Plan* proposes the addition of the Twin Peaks highway interchange at Interstate 10. If implemented, this interchange in combination with the traffic-calming strategies proposed in this alternative for the park's through-park roads would moderate traffic volume and speed conflicts, resulting in improved scenic driving opportunities through the park — a long-term major beneficial cumulative impact.

Other projects that may influence the range of recreational opportunities in Saguaro National Park include the designation of new public lands near both districts of the park. The Las Cienegas National Conservation Area is south of the Rincon Mountain District and the Ironwood Forest National Monument is near the western boundary of the Tucson Mountain District. Both of these new public lands are managed by the Bureau of Land Management and are undergoing planning at this time.

It is likely that these new lands would improve nature-based recreation opportunities in the region and help balance the range of recreational opportunities offered to regional visitors, including people that may visit Saguaro. The Ironwood Forest National Monument would provide extensive motor touring and bicycling opportunities, and the Las Cienegas National Conservation Area would increase the amount of wildlife watching and primitive hiking opportunities that are available nearby. In summary, these new lands in combination with the improved recreational opportunities proposed in this alterative would likely lead to a long-term moderate beneficial cumulative impact on the range of recreational opportunities.

Regarding opportunities for solitude and getting in touch with nature, the proposed Twin Peaks interchange, in combination with the proposed traffic calming in this alternative, would likely help moderate current impacts to the soundscape resulting from traffic conditions on Picture Rocks Road. This would improve opportunities for solitude in the designated wilderness areas adjacent to the road in the Tucson Mountain District, leading to a long-term moderate beneficial cumulative impact.

Regarding visitor access, the proposed Twin Peaks highway interchange at Interstate 10, in combination with the traffic-calming strategies proposed in this alternative, might alleviate some of the commuting traffic pressure along Picture Rocks Road. Currently, visitor access to the north end of Tucson Mountain District is hindered by high traffic volumes and speeding, creating unsafe conditions for visitor access. This proposed interchange in combination with proposed traffic calming would be a moderate beneficial cumulative impact for visitor access opportunities.

There are no projects contributing to cumulative impacts regarding opportunities for orientation, education, and interpretation. Therefore, there would be no cumulative impact related to this topic under alternative 3.

The proposed Twin Peaks interchange in combination with traffic calming on Picture Rocks Road would also likely contribute to cumulative impacts on visitor safety. The interchange along with the traffic-calming strategies would likely improve traffic conditions by reducing use levels and changing the pattern of use from predominately commuters to national park visitors, resulting in slower speed levels. In combination with the proposed traffic-calming strategies in this alternative, the interchange would result in a long-term major beneficial cumulative impact on visitor safety.

Conclusion

Alternative 3 would result in moderate beneficial impacts resulting from more opportunities to participate in diverse recreation opportunities that bring visitors in close contact with unusual and interesting desert life. Further, current adverse impacts from user conflicts on trails, increasing use in wilderness areas that may threaten visitors' opportunities for solitude, and increasing commuting traffic along through-park roads would be moderated via a variety of proposals that would greatly improve the visitor experience in the park over the long term — long-term moderate to major beneficial impacts.

Finally, the designation of new public lands near both districts of the park in combination with the improved recreational and visitor experience opportunities provided by Saguaro would have moderate beneficial cumulative impacts on the range of recreational opportunities and opportunities for solitude and getting in touch with nature. The proposed new Twin Peaks interchange in combination with the proposed traffic calming strategies in this alternative would have moderate to major beneficial cumulative impacts on the range of recreational opportunities, visitor access and visitor safety due to the likely improvement of traffic conditions on Picture Rocks Road and other through-park roads.

SOCIOECONOMIC ENVIRONMENT

Analysis

Under alternative 3, the emphasis would be on providing a wider range of opportunities for visitors while still maintaining compatibility with the national park's resource preservation and wilderness characteristics. Implementation of this alternative would result in a long-term beneficial impact on park visitors' sense of place while providing protection for park resources. This alternative takes into consideration the potential urban growth surrounding the national park and emphasizes the visitor experience.

As with alternative 2, roadways throughout both districts of Saguaro National Park would be reclassified to emphasize resource protection and safety. Traffic-calming devices would be implemented on Picture Rocks Road in the Tucson Mountain District as outlined in alternative 2. Likewise, the two-way scenic Bajada Loop Drive would be converted to a one-way loop drive. Unlike alternative 2, however, Golden Gate Road would remain open to vehicles under alternative 3. These proposed actions would generate income in the form of expenditures and earnings and would accommodate projected population growth. Installation of traffic-calming devices would generate construction, maintenance, and enforcement spending and earnings in the local economy. The visitor experience would be enhanced by implementation of these measures, which in turn would promote increased visitation and resulting spending in the community. Overall, these measures would generate a minor long-term beneficial socioeconomic impact to the local community.

Additional hiking and biking opportunities would be provided under alternative 3. Realignment and rehabilitation of selected trails would occur, and many trails would need to be redesigned to accommodate increased bicycle use. Additionally, some new trails would be developed. Trailheads would be improved and/or redesigned. Development of wheelchair accessible trails would be explored. All of these actions would be expected to translate into increased expenditures that would in turn generate earnings in the local economy in the short term. Moderate long-term increases in visitor expenditures would be expected. Social impacts would potentially be mixed, since changes in the visitor experience along trails, where visitors have often formed localized

sense of place associations, would be subjective.

Infrastructure in the Madrona/Chimenea Area would be replaced with a visitor contact station under alternative 3. A day ranger would be stationed at the visitor contact station, and only one trail would be accessible from the area. A small science center would also be constructed in the area and staff housing and corrals would be removed. Short-term expenditures and employment in the local economy would occur as a result of the modification and addition of infrastructure. Social impacts would likely be mixed, as these projects would have different impacts on user sense of place/people-place connections at the Madrona/Chimenea area.

Manning Camp would no longer house the fire and trail crew support facilities; these facilities would be removed to an off-site administrative area. As in alternative 2, the Manning Camp cabin would be maintained through rehabilitation and monitoring. Increased manpower would be required to accomplish this task, resulting in an economic gain. A ranger would also be assigned to the cabin during the summer, creating a minor beneficial economic impact in the form of at least one seasonal job.

Some new campgrounds could also be developed in the Rincon Mountain District above 4,500 feet, generating short-term expenditures and employment for construction and development activities. As in alternative 2, the Rincon Mountain District visitor center would be expanded to provide additional exhibit space. Additional interpretive media and programs would be developed, and a learning center, visitor contact station, and educational center could be developed. The Rincon Mountain District visitor center, visitor services, and parking area would also be expanded. Additional job opportunities as well as increased construction expenditures would generate short-term economic gains during the implementation of these projects. Like alternative 2, partnerships to develop the outdoor environmental educational center would also be undertaken to assist with the funding. As with other improvements, if these improvements translate into increased visitation, there could be long-term minor economic gains in Saguaro National Park's contribution to the local economy. Social impacts would be mixed and subjective to individual and group values tied to visitor experiences.

Cumulative Impacts

Other past, present, and foreseeable future actions that would potentially contribute to the actions considered under alternative 3 are similar to those listed for alternative 2 in that the visitor experience would be enhanced and visitation would increase, translating into a long-term economic benefit due to increased spending and generation of income. Considered alone, the impacts from alternative 3 would be minor. Implementation of alternative 3, in conjunction with other past, present, and reasonably foreseeable future actions, would have a moderate long-term cumulative effect. Increased urban development surrounding the national park in the Houghton area, Rincon/Southeast Subregional area, and the Tucson Mountain Subregional area would generate economic growth for the community, and potentially increase visitation at the national park. Provision for enhanced visitor experiences would create a moderate long-term beneficial economic effect on the community and the national park through increased spending and income. Improvement of the traffic conditions through creation of additional routes outside the national park and traffic-calming devices within the park would offer a moderate long-term beneficial effect, increasing visitation and the related spending for recreational activity.

Conclusion

Overall, there would be a moderate long-term beneficial effect created by the actions proposed under alternative 3. Enhancement of the visitor experience would serve to encourage visitors to Saguaro National Park and the local community, creating a long-term economic benefit from tourism and recreational activities. Installation of traffic-calming measures would enhance the visitor experience and would diminish the risk of resource loss and threat to public safety. Financial benefit would be realized in the form of a minor decrease in maintenance and law enforcement costs.

TRANSPORTATION

From a transportation impact perspective, Alternatives 2 and 3 are identical, with one exception: in alternative 3, Golden Gate Road in the Tucson Mountain District would remain open to traffic, and there would be no parking added south of the Golden Gate Road/Picture Rocks Road intersection.

Tucson Mountain District

Circulation. The road network within the district would be exactly the same as described for alternative 2, but Golden Gate Road would remain open to through traffic. Because traffic volumes on Golden Gate Road are very low (less than 100 vehicles per day), the impact of traffic on this road to circulation within the district and the surrounding roadway network would be minimal. Keeping Golden Gate Road open would have long-term, negligible, beneficial impacts for visitors and non-visitor users, because it preserves convenient access the Esperanza trailhead and the Ez-Kin-In-Zin picnic area from Picture Rocks Road.

For other circulation impacts from alternative 3, refer to the transportation impact analysis for alternative 2.

Safety. The Golden Gate Road/Picture Rocks Road intersection is one of the highest accident locations along the Picture Rocks Road corridor. The intersection is on a tight curve, resulting in sight distance and other safety concerns. A continuation of these conditions under alternative 3 would result in a long-term, major adverse impact on visitors and non-visitor users because of the high potential for accidents at this location.

For other safety impacts from alternative 3, see transportation impact analysis for alternative 2.

Parking. Parking lots in this district is generally well under capacity, with the exception of the Esperanza trailhead on Golden Gate Road (at capacity on weekends, but with additional parking near by). The lack of parking pullouts on Picture Rocks Road is an on-going concern because it could alleviate some of the current conflicts between slower-traveling visitors and the faster-moving non-visitor users (it would also enhance the visitor experience by offering the opportunity to pull off and enjoy scenic views safely). As a result, no additional parking on Golden Gate Road (as proposed in alternative 2) would result in long-term, minor adverse impacts to parking for visitors and long-term, negligible adverse impacts to non-visitor users.

For other parking impacts from alternative 3, see transportation impact analysis for alternative 2.

Cumulative Impacts. Cumulative impacts under alternative 3 would be the same as those described under alternative 2 with the exception of the following. Keeping Golden Gate Road open to through traffic would result in long-term, moderate, adverse safety impacts for visitors since this intersection is within the highest accident area along Picture

Rocks Road, and visitors would not be able take advantage of the pullout parking (and related safety benefits) that alternative 2 proposes. Non-visitor users would have a long-term, negligible to minor adverse impact because conflicts with visitors seeking roadside parking on Picture Rocks Road would continue. Implementation of alternative 3, in conjunction with other transportation plans and actions, would result in minor long-term adverse cumulative impacts to visitors and non-visitors. Alternative 3 would contribute a relatively small increment to the overall cumulative impact.

Conclusion. Keeping Golden Gate Road open to traffic would result in long-term, negligible, beneficial impact for visitors and non-visitors.

Conversion of the scenic Bajada Loop Drive/ Hohokam Road to a one-way loop with a new alignment off of Sandario Road would have long-term, moderate beneficial impact to visitor and non-visitor motorists.

The implementation of adaptive management approach to traffic calming on Picture Rocks Road to reduce speeding and accidents would result in short-term, moderate to major adverse impacts to non-visitor motorists due to increased travel time and/or the diversion of motorists to alternate routes described above until the Twin Peaks interchange is built. However the implementation of traffic-calming devices would result in long-term, moderate to major beneficial impact to park visitors due to providing a safer, more appropriate and leisurely park driving experience.

No safety improvements to the intersection of Golden Gate Road/ Picture Rocks Road would result in long-term, moderate adverse impacts on visitors and non-visitors. No additional parking on Golden Gate Road would result in long-term, minor adverse impacts to parking for visitors and long-term, negligible adverse impacts to non-visitor users.

Rincon Mountain District

Transportation impacts for alternative 3 would be identical to those described under alternative 2 for this district. Please refer to the transportation impact analysis for alternative 2 for this district.

PARK OPERATIONS

The emphasis of alternative 3 is directed toward providing a wider range of educational and recreational opportunities for visitors. Impacts on park operations under alternative 3 would be primarily on the divisions of Ranger Services, Facility Management, and Science and Resource Management. In addition to the minimum operating level of 76.5 employees, the following positions would be necessary if alternative 3 was implemented:

1 education specialist (for the learning center, science center, and education centers)
1 interpretation ranger (for the learning center, science center, and education centers)
1 maintenance mechanic (for the learning center, science center, and education centers)
2 law enforcement rangers (one for regulating and protecting sensitive natural and cultural resources in the Madrona section of the park and one for law enforcement on Picture Rocks Road to ensure safe speed limits, to assist with potential traffic and circulation problems, and to assist with increased visitor encounters with wildlife and other emergencies
1.5 trail workers (for restoration and rehabilitation of trails and potential opportunities for developing bicycle trails and connecting park trails to regional trail networks
1 community planner (the proposed partnerships program)

1 biological technician (to protect and restore natural resources and in response to greater demands on these same resources due to increased visitation)

Public Facilities

Trails and Trailheads. A comprehensive trail plan is being developed and would recommend sustainable trail design and trail realignment/rehabilitation. The trail plan would be an improvement to current trail management strategies that are either limited or piecemeal in nature and would create a long-term major beneficial effect on park operations through reduced trail maintenance and reduced user conflicts requiring additional staff time.

As recommended by the comprehensive trails plan, regional trail connections would be made, single-use trails would be established, and new trails might be developed under this alternative. These actions, if implemented, would have short-term moderate adverse effects on park operations due to the staff time required to build these trails and connections, and minor adverse effects on park operations as a result of increased long-term maintenance. Some trailheads would be upgraded, creating short-term minor adverse effects on park operations during construction and long-term minor beneficial effects on park operations over the long term as a result of decreased maintenance.

Within the Rincon Mountain District, the Camino Loma Alta Trailhead would be formalized, including the construction of a vault toilet, and the Hope Camp Trail would be explored for development as a bicycle trail. A large portion of areas outside designated wilderness in both districts would be designated as natural zone under this alternative, thereby opening these areas to trail use options not currently offered, such as paved accessible trails, interpretive trails, and trails for bicycles. A bicycle trail along the pipeline right-of-way in northeastern portion of this district might be developed. New trails and new designated uses would create moderate adverse effects on park operations in the short term as a result of construction and related staffing requirements, and in the long term as a result of increased maintenance requirements.

Public Access Park Roads and Entrance Stations. Under alternative 3, the primary changes to park roads would consist of installing traffic-calming devices on the Picture Rocks Road and converting the scenic Bajada Loop Drive to a one-way road.

Under this alternative, traffic-calming devices would be installed on an incremental basis, as needed, in response to traffic management issues and speeding violations on this road. The installation of traffic-calming devices would create a short term moderate adverse effect on park operations as a result of initial investment, construction, and the necessary precautions to provide a safe environment for employees and road users during construction activities. The long-term effect related to annual maintenance on these new facilities would be minor and adverse. The increase in fee collections would provide funding for the additional maintenance requirements.

If additional traffic calming is needed, the adverse effects of installing the devices and the potential permanent staffing of two new entrance stations/fee kiosks would be considerably offset as a result of increased entrance fee revenue collected and would constitute a negligible beneficial effect on park operations.

Installation of these devices would also be accompanied by a limited period of increased law enforcement to ensure compliance with desired traffic management conditions, creating an additional short term moderate adverse effect on park operations/staff time. Over the long term, the installation of these devices would be expected to decrease the

need for law enforcement and emergency services along Picture Rocks Road, which would have a major beneficial effect on park operations.

Parking Areas. Parking areas would be formalized and expanded at trailheads and at the Rincon Mountain District visitor center, and a new parking area would be developed at the Camino Loma Alta trailhead. More parking would be developed under this alternative than under alternative 2, creating more area that would require maintenance. As long as increases in parking areas and availability are proportionate to user capacity thresholds and this new development does not create a larger management problem in the long run as a result of increased use, it is expected that there would be long-term minor beneficial effects on park operations under alternative 3 with regard to parking improvements. More designated and better defined parking would decrease the need for park traffic management and lessen the impact on natural resources thereby reducing staff time required to mitigate those impacts. There would be short term minor adverse effects on park operations as a result of construction activities.

Visitor and Education Centers. The Rincon Mountain District visitor center would be expanded under this alternative. Visitation to this facility has increased over the past 50 years. A rehabilitated building with a new addition would better accommodate larger crowds through proper design and would improve the operational efficiency of this building. Outdated and inefficient building infrastructure currently requires frequent repair and maintenance to address regular breakdowns. A total overhaul of mechanical systems and upgrade of the existing building would greatly reduce the deferred maintenance backlog for this building. Under this alternative, offices in the visitor center/headquarters and the annex would be moved to an off-site location. The expansion and upgrade of the visitor center would create short-term moderate adverse effects on park operations during construction, but would in the long term be a major beneficial effect on park operations because of increased efficiency and the elimination of incompatible uses in the current visitor center. Long-term minor adverse effects would be expected as a result of increased maintenance and operational requirements because of the proposed increase in the size of the facility.

A partnership education center would be constructed at Camino Loma Alta, and a visitor contact and science station would be constructed at Madrona. If the headquarters were moved off site, the existing building could be used as an education center. A separate learning center would be developed when private facilities on the life estate property (just off Speedway Boulevard) are transferred to the park. Along with the education facilities in the headquarters building mentioned above, all of these education facilities would have a long-term major beneficial effect on park operations because of increased facilities to assist park staff in educating visitors. There would be minor adverse effects on park operations in the short term as a result of construction activities and in the long term as a result of increased requirements for facility maintenance.

Orientation, Wayside Exhibits, and Interior Exhibits. Additional interpretive media and exhibits would be developed and installed to provide information on the history of the area and stewardship of natural resources. Interior exhibits in the Rincon Mountain District visitor center would be updated under this alternative. Additional wayside exhibits would be added on some existing and proposed interpretive trails. Orientation panels would be updated and added at park trailheads during trailhead improvements. New interpretive exhibits and information panels would assist staff in educating the public about the park. The new exhibits and panels would create a long-term moderate beneficial effect on park operations related to visitor services,

but would also create a minor adverse impact on park operations regarding ongoing maintenance. There would be short term moderate adverse effects during installation.

Camping. Additional backcountry campgrounds might be developed in the Rincon Mountain District above 4,500 feet. This would have minor short-term adverse effects on park operations regarding the construction of dispersed sites within the campground, and long-term moderate adverse effects on park operations as a result of ongoing maintenance to service these sites.

Administrative Facilities

Offices, Storage, and Park Buildings. All park facilities that house staff operations at the Rincon Mountain District that are not essential to be located within the park would be moved outside the park boundary to minimize development within the park. (Existing facilities would be converted to public education facilities with individual classrooms.) The headquarters annex building would be removed when an appropriate facility for administrative functions is located or constructed. All new office space would be increased in size to accommodate increased staff levels and would therefore constitute a long term major beneficial effect on park operations. There would be short-term moderate adverse effects on park operations during this proposed move and short-term moderate adverse impacts during building removal.

Corrals. The overall long-term effects of removing the corral at Madrona would be minor and beneficial (a combination of a minor adverse impact not having a facility to use and a moderate beneficial impact of not having a building to maintain).

Park Housing/Visitor Contact Station. Existing park housing at Madrona would be removed as a result of a public health service recommendation to discontinue use. A new visitor contact station would be constructed in this same area. This new contact station would create long term major beneficial effects on park operations because of the presence of park staff on-site in the Madrona area. The need for potable water to be hauled to this site for use by park staff under this alternative would create a long-term moderate adverse effect on park operations. The adverse and beneficial long term effects on park operations created by this alternative when considered together renders an overall long-term minor beneficial effect on park operations. There would be a short term minor adverse effect on park operations during building removal and construction.

Other Buildings. Many of the facilities at Manning Camp that require maintenance and upkeep would be removed, and fire operations that use this facility would be discontinued under this alternative. This action would result in a long-term moderate beneficial effect on park operations and a short-term moderate adverse effect on park operations during removal. Fire crew support facilities would be moved from Manning Camp to a new off-site administration area. There would be a long-term moderate beneficial effect as a result of moving fire operations to a less remote location.

The Civilian Aeronautical Administration building would be donated to an interested organization and relocated or would be documented and razed. The removal of this building would create long term moderate beneficial effects on park operations by removing stabilization and preservation requirements for this building. There would be short-term minor adverse effects on park operations during removal.

Cumulative Impacts

As described in chapter 2, alternative 3 proposes several changes to park manage-

ment, including facility improvements and increased staff to address and accommodate increased visitation and educational opportunities. These changes would create an overall improvement to current management practices regarding effective visitor services and performance of required duties to manage Saguaro National Park as legislated by Congress.

The recently rehabilitated (fall 2006) Cactus Forest Loop created minor long-term beneficial impacts because it is a defined, closed loop tour road, requiring less maintenance time for park staff.

An increase in unregulated social trails into and within park boundaries is expected to occur as a result of new development on adjacent private lands and would require additional staff time to correct, repair, and manage associated adverse effects. The occurrence of invasive exotic plants in the park is expected to increase as new development on adjacent lands would inevitably introduce exotic, invasive, ornamental species, which would also require additional park staff time to manage and control the associated adverse effects.

Impermeable hardened surfaces, buildings, and constructed barriers associated with development all influence and impact the natural migration of native species and would further create habitat fragmentation in the greater Tucson area. Park staff would be required to manage adverse effects. The incremental impacts on cultural resources within the park would continue to require park staff time and effort to enforce, monitor and correct adverse effects. Improvements to park facilities and management practices, coupled with the addition of a biological technician, law enforcement rangers, and trail workers, is expected to assist park operations in managing the above-mentioned impacts.

An increase in highly flammable, nonnative plants on private property adjacent to park wilderness lands creates an incompatible and complex situation for wildfire management between these two types of land uses. A major fire could severely impact park operations as a result of necessary wildfire suppression required to protect adjacent private property.

The anticipated increase in visitation to Saguaro National Park and increasing development on adjacent private lands would require greater staff intervention to provide adequate visitor services and to address associated resource impacts. Alternative 3 would mitigate some of the incremental adverse effects to park operations created by increased visitation and use in the short term by increasing staff and improving facilities. Even with additional staff and improved facilities, the above mentioned actions in combination with actions proposed under this alternative would have adverse cumulative impacts on park operations due to the increased management requirements necessary to address these issues. Cumulative impacts could become appreciable if an adequate ratio between staff and visitors is not maintained or facility conditions fail to meet demand and need over the long term. Although increased staff would be realized under this alternative, and the impacts would be mitigated, the overall cumulative effect on park operations would be minor and adverse. This alternative's contribution to those impacts would be relatively small.

Conclusion

The additional positions required to address expanded programs and opportunities for park visitors described under alternative 3 would be expected to result in long-term moderate beneficial effects on park operations by accommodating increased use.

Actions that would create long-term moderate adverse effects on park operations would be the required ongoing maintenance of the

Golden Gate Road, new trails, and possible new campsites.

The lack of housing at Madrona, and long-term maintenance requirements for the new education centers, new exhibits, and a new vault toilet at the Camino Loma Alta Trailhead would all create long-term minor adverse effects on park operations.

Actions that would create short-term moderate adverse impacts on park operations due to construction and implementation requirements include the installation of traffic-calming devices along Picture Rocks Road, the potential construction of new trails, and the expansion of the Rincon Mountain visitor center with new exhibits. The relocation of park offices to a new facility would also constitute a short-term moderate adverse effect on park operations during this transition.

Actions that would create short-term minor adverse effects include the construction of new parking areas and the removal of the corral, park housing, and CAA building at Madrona.

Actions that would create long-term major beneficial impacts on park operations and facilities would include improvements to trails and trailheads, expansion of the Rincon Mountain District visitor center, construction of traffic-calming devices along Picture Rocks Road, development of adequate office space for park staff, and construction of a visitor contact station and science station at Madrona and rehabilitation of existing facilities for learning and education centers.

Actions that would create long-term moderate beneficial effects on park operations and facilities include the relocation or removal of the CAA building at Madrona, the removal of the corral and park housing at Madrona, and the new exhibits and interpretive media installed in the Rincon Mountain visitor center and at key locations around the park.

The removal of nonhistoric facilities at Manning Camp would create long-term moderate beneficial effects on park operations.

As long as increases in parking areas and availability were proportionate to user capacity thresholds for the park and this new development does not create a larger management problem in the long run as a result of increased use, it is expected that long-term effects would be minor beneficial under alternative 3.

Although increased staffing would be realized under this alternative, and the impacts would be mitigated, the overall cumulative effects on park operations would be adverse over the long term. This alternative's contribution to those impacts would be minimal.

UNAVOIDABLE ADVERSE IMPACTS

The following paragraphs describe the more important (moderate and major intensity) adverse impacts that would result from implementing this alternative. These are residual impacts that would remain after mitigation was implemented. The negligible and minor impacts are described in the foregoing analysis.

There would likely be a short-term moderate adverse impact on native vegetation during construction activities such as new trailheads, visitor center expansion, improved parking lots, and the new scenic Bajada Loop Drive segment.

Construction activities would have a short-term moderate adverse impact on wildlife.

Increased visitation throughout the park, especially on park trails, might result in a long-term moderate impact on soils. The creation of additional backcountry campsites in the Rincon Mountain District would adversely impact park operations as a result of increased maintenance requirements.

Under all alternatives, proposed actions would strictly avoid known archeological sites. Any such sites that could not be avoided because of ground-disturbing activity would be mitigated in concurrence with the Arizona state historic preservation officer. Mitigation such as data recovery would constitute an unavoidable adverse impact on the archeological sites involved.

Under alternatives 2 and 3 in the Madrona area of the Rincon Mountain District, there would be documentation and recordation as mitigation in concurrence with the Arizona state historic preservation officer about donating the Civilian Aeronautical Administration building to a willing taker and removing and relocating it out of the park, or razing it. Either relocating the CAA building or razing it would be an unavoidable adverse impact on this historic property.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

The irretrievable and irreversible commitments of resources that are associated with this alternative are summarized below. Irreversible commitments are those that cannot be reversed, except perhaps in the extreme long term (e.g., the regrowth of an old-growth forest). Irretrievable commitments are those that are lost for a period of time (e.g. if a road is constructed, the vegetative productivity is lost for as long as the road remains).

The expanded visitor center would result in a loss of vegetative productivity and wildlife habitat for as long as the structure remains.

For cultural resources under any of the alternatives, although not anticipated, the mitigation of any archeological sites would constitute an irreversible and irretrievable commitment of resources. Mitigation such as data recovery would change the status of archeological artifacts and other archeological information and data from in situ preservation for the future to current extraction via excavation. It is possible that some information might be lost in the process because future excavation methods could improve, thereby potentially yielding more information than current methods provide.

Under alternatives 2 and 3, relocating the Civilian Aeronautical Administration building out of the park, or razing it, would not only be an unavoidable adverse impact on this historic property but also an irreversible and irretrievable commitment of resources. The historic fabric of the building would irreversibly change, or it simply would not physically exist any more.

RELATIONSHIPS BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Most of the park would be protected in a natural state and would maintain its long-term productivity under alternative 3. Only a very small percentage of the park would be converted to developed areas. No actions in this alternative would jeopardize the long-term productivity of the environment. Short-term impacts might result from construction — such as localized increases in air pollutants, as detailed in the foregoing analysis. Noise and human activity from construction and restoration activities might displace some wildlife from the immediate area. However, these activities would not jeopardize the long-term productivity of the environment.







5

Consultation and Coordination

PUBLIC AND AGENCY INVOLVEMENT

The *Draft General Management Plan/ Environmental Impact Statement* for Saguaro National Park represents thoughts of the NPS/park staff, Native American groups, and the public. Consultation and coordination among the agencies and the public were vitally important throughout the planning process. The public had several avenues by which it participated during the development of the plan: participation in public meetings, responses to newsletters, comments on the park's Website, participation in a visitor or neighborhood survey, and participation in focus groups.

PUBLIC MEETINGS AND NEWSLETTERS

Public meetings and newsletters were used to keep the public informed and involved in the planning process for Saguaro National Park. A mailing list of about 4,000 names and addresses was compiled that consisted of members of governmental agencies, organizations, businesses, legislators, local governments, and interested citizens.

The notice of intent to prepare an environmental impact statement was published in the *Federal Register* on August 8, 2003.

The first newsletter, issued in June 2003, described the planning effort. Advertisements were placed in local newspapers and on radio stations. Public meetings were held during July 2003 in Tucson and were attended by about 75 people. A Spanish translator was present. The National Park Service also met with city, county, and state agencies in July 2003. The National Park Service received comments in the meetings and in the response to the first newsletter. Nearly 300 electronic and mailed comments were received in response to this newsletter.

The National Park Service also held focus group meetings to provide additional input for this management plan. The purpose of the focus group meetings was to meet with representatives from organized interest groups, such as recreation users, neighborhood associations, and conservation groups to gain input on issues and concerns related to the general management plan. Approximately 30 individuals participated. During the focus group meetings, participants commented on what they valued about the park and concerns they had about park management. The participants also provided input on ways to resolve perceived conflicts/concerns.

The following is a brief summary of the major comments received by the public during the scoping process for this management plan.

Summary of Public Scoping Comments from Newsletters One and Two, Public Meetings, and Focus Groups

Most of the newsletter respondents and public meeting attendees were from the Tucson area, and most appear to live near the park. Most people believe the park is special because it protects the Sonoran Desert, as well as a unique desert fauna and flora. Many specifically mentioned the saguaro and cacti as being special. Interestingly, quiet was specifically mentioned by many respondents as a special quality of the park. People appreciate the special resources, scenery, views, and open space, and the serenity, peace, and relaxation it brings. Many enjoy the visitor centers and the trails for hiking, biking, and horseback riding. Many people noted how much they like the diversity of visitor opportunities in the park. Although most people did not mention wilderness as a special resource, a number of people appreciated attributes associated with wilderness, particularly natural quiet, solitude, and getting

close to nature. Some of the special places in the park that people highlighted in their comments included Bridal Wreath Falls, Douglas Springs camping area, the summit of Pink Hill, the picnic areas, Wasson Peak, and the park's visitor centers.

Many respondents mentioned not liking the amount of trash they have seen in or near the park, especially along the park boundaries. Poor trail condition (e.g., trail rutting/erosion and widening) was frequently mentioned as a problem by trail users. Other commonly mentioned topics that people least enjoyed included high levels of traffic on roads through the park, development along the park boundaries, ATVs (all-terrain vehicles), and trail closures. Several trail users brought up the steps that had been installed on trails, which they strongly disliked. Some mentioned the need for more maintenance, while others complemented the trail maintenance. Some people mentioned disliking bicyclists on the trails or noted conflicts between horseback riders and bicyclists. A few people mentioned disliking fees being charged, although others supported additional fees if needed, as long as they were equally applied to all park users.

By far, most respondents would like to see no change, or very little change, in the park in the future — they like the park's natural setting as it is. They want the park to continue to protect resources and do not support more park developments, particularly roads and commercial developments. Many people appreciate and support NPS management of the park. Some people wanted to see a few more trails or parking areas/trailheads, or trails designated for a single use. Several respondents wanted additional horse trailer parking facilities. A number of respondents wanted to see traffic levels limited and/or slowed down on through-park roads, and some specifically mentioned supporting the closure of Picture Rocks Road. Picture Rocks Road was viewed by many people as being a problem, with litter, accidents, speeding, etc. Many brought up law enforcement concerns, particularly along the park boundary. Quite a few people wanted to see the park expanded, some wanting this as a buffer against adjacent development. Several respondents brought up the need for continuing or increased partnerships with others to ensure that the park is protected. Some people wanted more signs, maps, and interpretive programs.

The most frequently mentioned concern for the future of the park was encroachment by houses and other developments along the park boundaries, which brings increased traffic, pollution, trash, illegal activities, loss of habitat, etc. Overuse of the park due to Tucson's increasing population and traffic were also frequently mentioned as concerns. Future trail closures were frequently mentioned as a concern, particularly by horseback riders and bicyclists. A few people were concerned about impacts of the park on adjacent landowners. There were comments both supporting and opposing restrictions on recreational use, such as on the use of bicycles and horses. Other concerns included NPS funding, lack of staff, commercial developments in the park, and fear of the park being downsized or sold to developers.

All of these comments were considered/ incorporated into the issues for the plan, as appropriate.

A second newsletter distributed in March 2005 provided a summary of the public scoping process and information gathered as a result of the ongoing visitor use and transportation studies. In addition, this newsletter provided background on some of the major issues that would be addressed by the plan. Public meetings, attended by about 50 people, were held in March to allow the interested public to ask questions about the scoping and research/study information and related issues. The National Park Service also met with city, county, and state agencies in March 2005 to review the information.

Summary of Public Scoping Comments from Newsletter Three and Public Meetings

A third newsletter distributed in June 2005 described the draft alternatives for managing the national park. Approximately 300 electronic and mailed comments were received in response to that newsletter. Public meetings were held during June 2005 in Tucson and were attended by about 250 people, with the highest turnout at the meeting near the Tucson Mountain District. The National Park Service also met with city, county, and state agencies in June 2003 to review the proposed alternatives.

Most respondents to the newsletter and attendees to the public meetings preferred alternative 2 overall, along with particular elements of alternative 3 that were related to specific recreation opportunities. Most comments stressed the importance of protecting the unique and fragile resources of the park. In addition, many respondents noted the importance of protecting the park's wilderness qualities as part of the management plan. Many comments were related to the road management alternatives — both in support and in opposition to the traffic-calming strategies proposed. Many respondents suggested that the park should continue to seek closure of Picture Rocks Road to protect park resources. Several people also noted a variety of specific traffic-calming strategies that should be considered for managing the roads through the park including pull-outs, lower speed limits, better law enforcement, bike paths along the roads, and restrictions on commercial vehicles. Other respondents were concerned about traffic-calming strategies that might hinder emergency vehicle access to the local community and increase traffic congestion on nearby roads.

Many people also commented on trail management concerns related to the alternatives. Many people supported improvements to Broadway, Speedway and Camino Loma Alta trailheads in the Rincon Mountain District. There was also support for the connections of regional trails to the park, particularly the Arizona Trail to the south boundary of the Rincon Mountain District. There were an equal amount of comments supporting and opposing more bicycling opportunities. There was a similar split of comments in support and opposition to the issue of restricting horses as well as providing single-use trails for different user groups.

Most people that commented on the elements of the alternatives related to the Madrona area were in favor of keeping access to the site highly regulated to protect the area's sensitive resources. Other comments were received in support of keeping facility development in the park low and on the periphery. Several comments suggested that the National Park Service seek an increase in the park's boundary and acquisition of current inholdings in the park. Finally, some people supported the need for a new educational center.

CONSULTATION WITH OTHER AGENCIES/ OFFICIALS AND ORGANIZATIONS (TO DATE)

U.S. Fish and Wildlife Service

The Endangered Species Act of 1973, as amended, requires in section 7 (a) (2) that each federal agency, in consultation with the secretary of the interior, ensure that any action the agency authorizes, funds, or carries out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. This section of the act sets out the consultation process, which is further implemented by regulation (50 CFR 402).

In July 2004 the planning team initiated informal consultation with the U.S. Fish and Wildlife Service to determine the presence of federally listed threatened and endangered

species in Saguaro National Park. A telephone conversation with the Tucson Field Office of the Fish and Wildlife Service in 2006 was held to discuss the project and get input on the last species list for the park.

In February 2006, the planning team requested an updated list of listed and proposed threatened and endangered species, candidate species, and species of concern that might be present in the park. To remain up to date about listed and proposed threatened and endangered species, the National Park Service has consulted the USFWS website. Copies of the three newsletters also were provided for the U.S. Fish and Wildlife Service, and the agency will be given a copy of this draft document for review.

Consultation with Native Americans

The National Park Service recognizes that indigenous peoples have traditional and contemporary interests and ongoing rights in lands now under NPS management, as well as concerns and contributions to make for the future via the scoping process for NPS general management plans and other projects. Related to tribal sovereignty, the need for government-to-government Native American consultations stems from the historic power of Congress to make treaties with American Indian tribes as sovereign nations. Consultations with American Indians and other Native Americans, such as Alaska Natives and Native Hawaiians, are required by various federal laws, executive orders, regulations, and policies. For example, such consultations are needed to comply with Section 106 of the National Historic Preservation Act of 1966, as amended. Implementing regulations of the Council on Environmental Quality for the National Environmental Policy Act of 1969), as amended, also call for Native American consultations.

During October 2002, Saguaro National Park superintendent Sarah Craighead requested by letter that the heads of government (chairpersons, governors, or presidents as the case may be) of the American Indian tribes traditionally associated with the park meet for government-to-government consultations about the commencement of the general management plan. The letter was sent to the Ak Chin Indian Community Council, the Fort McDowell Yavapai Nation, the Gila River Indian Community Council, the Hopi Tribe, the Pascua Yaqui Tribe, the Salt River Pima-Maricopa Indian Community, and the Tohono O'odham Nation. A letter to the governor of the Pueblo of Zuni was sent on July 1, 2003. It came to the superintendent's attention that because of prehistoric contacts with the Hohokam, who once lived in what is now the park, the Pueblo of Zuni might wish to be considered and included as an American Indian tribe traditionally associated with Saguaro National Park. (See also appendix I for a list of tribes traditionally associated with the park.)

These tribes were subsequently sent letters about the three partners' workshops in July 2003, March 2005, and June 2005 to which representatives from federal, tribal, state, county, and municipal governments were invited. The park superintendent made follow-up telephone calls to the tribal heads of government to reiterate her requests for consultation and to invite them to the partners' meetings.

Such telephone calls by the superintendent were also part of making the arrangements with the leadership of the Tohono O'odham Nation for the ongoing ethnographic study on the traditional Tohono O'odham harvesting of the saguaro fruit in the Tucson Mountain District. That study is being conducted by Dr. Rebecca Toupal of the Bureau of Applied Research in Anthropology of the University of Arizona at Tucson.

A representative from the Tohono O'odham Nation attended the March 11, 2005, partners' meeting and expressed concern for the

protection and preservation of cultural resources and the need to be informed if cultural resources might be disturbed by any park plans. An understanding exists that a tribe will contact the national park when there is a particular concern but normally not otherwise. The national park's staff respects tribal sovereignty and the fact that tribes decide their own priorities and ways of doing business. The staff of the national park has worked well with tribes in the past when issues of concern have materialized. Examples are the responses of the Hopi Tribe and the Tohono O'odham Nation to the rehabilitation of Cactus Forest Drive in the Rincon Mountain District. The tribes suggested that any trails from the turnouts be away from known archeological sites and that paving, curbs, and interpretive signs should be used "to encourage visitors to stay on the pavement, curtailing or perhaps even eliminating the proliferation of social trails that affect such resources" (Baldridge et al. 2004:79).

During June 2006, Saguaro National Park superintendent Sarah Craighead received comments from the Cultural Affairs Division of the Tohono O'odham Nation. The statement was made that the park staff should ensure that cultural resources are always included in considerations about how to manage the park as part of a continuing focus on the preservation and protection of all cultural resource sites. In general, there should be more involvement with the tribes traditionally associated with the park. More specifically, the idea of directing visitors away from known cultural resource sites was reiterated. For the interpretation of cultural resources to visitors, the request was made to expressly consult with the Tohono O'odham Nation in designing wayside signs for cultural site interpretation of relevance to the Tohono O'odham. It was mentioned that new trail development should be minimized to avoid possible archeological sites. Visitor behavior respectful of the cultural significance of the park, especially during off-trail use, should be encouraged through different ways of education, including law enforcement.

Consultations for the Native American Graves Protection and Repatriation Act of 1990

Museum collections of Saguaro National Park stored at the NPS Western Archeological and Conservation Center in Tucson have been partially inventoried for items covered by the Native American Graves Protection and Repatriation Act, such as human remains, funerary objects, and sacred or other objects of cultural patrimony. There are human remains from five prehistoric individuals. The remains (now in the NPS Western Archeological and Conservation Center) relate to the Rincon Mountain District. Associated with these remains are five funerary objects. No inventorying has been carried out on artifacts that could be items of cultural patrimony. Consultations have not yet been conducted about the human remains or items of cultural patrimony. Park staff, under the direction of the superintendent, in each instance will conduct the consultations. A tribe or tribes traditionally associated with the park could adopt the remains for repatriation, since lineal descent of the historic/ contemporary tribes from prehistoric peoples in the area is possible but not directly apparent. When the requisite procedures of inventorying and consulting are completed, all mandates of the Native American Graves Protection and Repatriation Act will have been met.

Consultation with the Arizona State Historic Preservation Officer

Agencies that have direct or indirect jurisdiction over historic properties are required by Section 106 of the National Historic Preservation Act of 1966, as amended (16 USC 270, et seq.), to take into account the effect of any undertaking on properties listed in or eligible for listing in the National Register of

Historic Places. Saguaro National Park superintendent Sarah Craighead informed and invited the Arizona state historic preservation officer as follows. By way of a letter dated September 17, 2002, to start meeting the requirements of 36 CFR 800, the superintendent informed SHPO James W. Garrison about the start of the *General Management Plan / Environmental Impact Statement* and invited him and his staff to participate in the planning process and to comment on the draft plan as it progressed. On September 18, 2002, the superintendent sent a similar letter of information and invitation for participation, if necessary, to the Advisory Council on Historic Preservation by way of copying Western Office of Project Review historic preservation specialist Jane Crisler. As the schedule developed, the state historic preservation officer was kept informed of public meetings and other planning events and benchmarks. All of the planning newsletters were also sent these officials with a request for any comments. Although there was no SHPO attendance at the meetings, SHPO comments and advice were welcome at any time on planning for possible decisions regarding protection and preservation of Saguaro National Park's array of significant historic properties. At the appropriate time, SHPO review and comment upon the draft plan is called for.

Consultation with the Arizona State Historic Preservation Officer on the Preferred Alternative

Under the terms of stipulation VI.E of the 1995 programmatic agreement among the National Park Service, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers, the National Park Service will work in consultation with the state historic preservation officer. Actions that qualify as programmatic exclusions under IV A and B will be identified, as well as will other undertakings that will require further review and comment under 36 CFR 800.4-6. The actions listed in table 23 are in the latter category. Other compliance, as appropriate, is also listed.

TABLE 23. FUTURE COMPLIANCE REQUIRED FOR IMPLEMENTATION OF SPECIFIC ACTIONS (ALTERNATIVE 2)

Action	Section 106 Compliance Requirement
Removal and relocation or razing of the Civilian Aeronautical Administration building	Further SHPO consultation necessary
If eligible for the National Register of Historic Places, discovery of archeological sites that cannot be avoided via survey of areas for new ways of visitor access, buildings, trails, campsites, or expansion of existing ones	Further SHPO consultation necessary
Adaptive reuse of historic structures for visitors or park personnel	Further SHPO consultation necessary
Reconfiguration of Manning Camp in relation to Manning Cabin	Further SHPO consultation necessary
Other Compliance Requirements	
Development in previously undisturbed areas.	Determine if in a floodplain or a wetland.

AGENCIES, ORGANIZATIONS, AND INDIVIDUALS RECEIVING A COPY OF THIS DOCUMENT

FEDERAL AGENCIES

Advisory Council on Historic Preservation
U.S. Department of Agriculture
  U.S. Forest Service
  Coronado National Forest
    Santa Catalina Ranger District
  Natural Resources Conservation Service
U.S. Department of Homeland Security
  Customs and Border Protection, Tucson Sector
U.S. Department of the Interior
  Bureau of Land Management
    Ironwood Forest National Monument
  National Park Service
    Casa Grande Ruins National Monument
    Chiricahua National Monument/Ft. Bowie National Historic Site
    Coronado National Memorial
    Flagstaff Group NPS
    Glen Canyon National Recreation Area
    Grand Canyon National Park
    Hubbell Trading Post National Historic Site
    Lake Mead National Recreation Area
    Montezuma Castle/Tuzigoot National Monuments
    Organ Pipe Cactus National Monument
    Navajo National Monument
    Petrified Forest National Park
    Pipe Spring National Monument
    Rocky Mountain National Park
    Southern Arizona Group office
    Tonto National Monument
    Tumacacori National Historical Park
    Western Archeological and Conservation Center
  U.S. Fish and Wildlife Service
U.S. Environmental Protection Agency

U.S. SENATORS AND REPRESENTATIVES

Honorable John McCain, Senator
Honorable Jon Kyl, Senator
Honorable Raul M. Grijalva, House of Representatives
Honorable Gabrielle Giffords, House of Representatives

STATE AGENCIES

Arizona Department of Agriculture
Arizona Game and Fish Department
Arizona State Land Department
Arizona State Parks
  State Historic Preservation Office
State of Arizona
University of Arizona, Tucson

STATE OFFICIALS

Honorable Janet Napolitano, Governor
State Representative Manuel V. Alvarez
State Representative Olivia Cajero Bedford
State Representative David T. Bradley
State Representative Jennifer J. Burns
State Representative Steve Farley
State Representative Pete Hershberger
State Representative Phil Lopes
State Representative Linda Lopez
State Representative Marian A. McClure
State Representative Jonathan Paton
State Representative Tom Prezelski
State Representative Lena S. Saradnik
State Senator Paul Aboud
State Senator Marsha Arzberger
State Senator Timothy S. Bee
State Senator Jorge Luis Garcia
State Senator Charlene Pesquiera
State Senator Victor Soltero

AMERICAN INDIAN TRIBES TRADITIONALLY ASSOCIATED WITH PARKLANDS

Ak Chin Indian Community Council
Fort McDowell Yavapai Nation
Gila River Indian Community Council
Hopi Tribe
Pascua Yaqui Tribe
Salt River Pima-Maricopa Indian Community
Tohono O'odham Nation
Pueblo of Zuni

LOCAL AND REGIONAL GOVERNMENT AGENCIES

City of Tucson
City of Tucson Parks and Recreation
City of Tucson, Department of Transportation
Colossal Cave Mountain Park
Pima Association of Governments
Pima County
Pima County Board of Supervisors
Pima County Flood Control
Pima County Natural Resources, Parks and Recreation
Pima County Sheriff's Posse
Special Staff Assistant, District 4, Pima County Board of Supervisors
Town of Marana
Tucson City Council
Tucson Department of Transportation
Tucson Fire Department

ORGANIZATIONS AND BUSINESSES

49er Water Company
A & S Holdings Limited Partnership
Academy Village Neighborhood Association
Adventure Travel
Alaska Coalition
Aline-Goodman Properties
All Creeds Brotherhood Inc.
Alliance of Backcountry Parachutists
Anza Trail Coalition of Arizona
Api Land Limited Partnership
Arizona Alliance Planning Commission
Arizona Archeological and Historical Society
Arizona Fish and Wildlife, UA
Arizona Native Plant Society
Arizona Natural Plant Society
Arizona Open Land Trust
Arizona Quail Alliance
Arizona Trail Association
Arizona-Sonora Desert Museum
Aurora Loan Services Inc.
Avra Water Co-Op Inc.
Bankers Trust Co of California
Bear Canyon Neighborhood Association
Blue Sky Fitness and Recreation
Canyon Ranch Resort
Catalina Line Riders
Center for Biological Diversity
Center for Desert Archaeology
Cernus & Associates Inc.
Citizens for Picture Rocks
Civano Neighborhood Association
Coalition for Sonoran Desert Protection
Commonwealth Properties Inc.
Country Walkers, Inc.
Coyote Creek
Deer Creek Ranch
Defenders of Wildlife
Desert Path Tours
Desert View Estates HOA
Diamond Ventures, Inc.
Dow Pak, Inc.
Eastside Neighborhood Association
Ecology & Evolutionary Biology, UA
El Adobe Ranch Portales
Emerali
Fable Arabians Organization
Firth & Associates
Friends of Saguaro National Park
Friends of the Sonoran Desert
Gates Pass Area Neighborhood Association
Greater Arizona Bicycling Association
Greater Tucson Economic Council
Harris Trust Bank of Arizona
Harrison East-South Neighborhood Association
Harrison Jeffrey Thomas Reserving Life
Historic Notch Neighborhood Association
Houghton HOA
Houghton Neighborhood Association

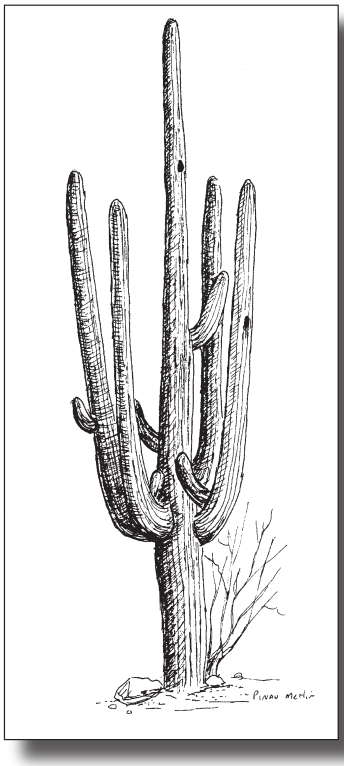
International Mountain Bicycling Association
Jcountry Realty
La Cebadilla Estates Corporation
Lawyers Title of Arizona
Lazy C Ranch Estates
Lazy K Bar Guest Ranch
Lost Canyon Estates HOA
Lp-1 Trust
LS Development Company Limited
Maco Realty
Mar Fran Enterprises Inc
Mile Wide Land & Cattle
Millstone Manor No2 Neighborhood Association
Miraval
Mountain Bike Association of Arizona
Mule Deer Foundation
National Parks and Conservation Association
Native & Nature Inc.
Nirtricks
Northern Trust Bank of Arizona
Notch Neighborhood Association
Off The Beaten Path
Old Spanish Trail Church of Christ
Old West Ranchettes HOA
Oldooz Development Inc.
Peoples Heritage Bank
Pima County Trails Association
Pima Trails Association
Pioneer Trust of Arizona
Premier Group
Qwest Corporation
R L Commercial Inc.
Rancho Chimayo
Rancho Verdad
Recon
Reddington Ranch Neighborhood Association
Redemptorist Society of Arizona Inc.
Regency Holding Company
Renewable Natural Resources
RI Farmer's Market
Rincon Creek Estates HOA
Rincon Desert Estates HOA
Rincon Institute
Rincon Land Investments
Rincon Water Company
Rio Verde Ventures
Rising Spirits Inc.
Rivers, Trails, and Conservation Association
Roadrunners
Rocking K Development
Ronnie Hilliard Living Trust
Saddlebags
Saddlebrooke Hiking Club
Saguaro Horsemen
Saguaro National Park West Volunteers
Senior Trekkers Club
Sierra Club
Sierra Club, Grand Canyon Chapter
Sky Island Alliance
Sky Island Treks
Smith Family Revocable Lifetime
Sonoran Desert Mountain Bicyclists
Sonoran Institute
South Harrison Neighborhood Association
Southeastern Arizona Horsemen's Association
Southern Arizona Group
Southern Arizona Hiking Club
Southern Arizona Mountain Bike Association
Southern Arizona Roadrunners
Southwest Trekking
Spanish Trail Outfitters
Spanish Trail Water Company
Stewart Title & Trust
Sun City Vistoso Club
Sun Southwest Contracting Inc.
Sundance Center (The)
Suntrek Tours, Inc.
Surban Wash Committee
Sweetwater Properties
Tangue Verde Ranch
Tanque Verde Guest Ranch
Tanque Verde Valley Association
The Academy Village
The Academy Village Neighborhood Association
The Carriage House
The County Line Riders of Catalina, Inc.
The Nature Conservancy
The NPS Southwest Center
Trails End
Tucson Audubon Society
Tucson Clean & Beautiful
Tucson Herpetological Society
Tucson Hispanic Chamber of Commerce
Tucson Metropolitan Chamber of Commerce

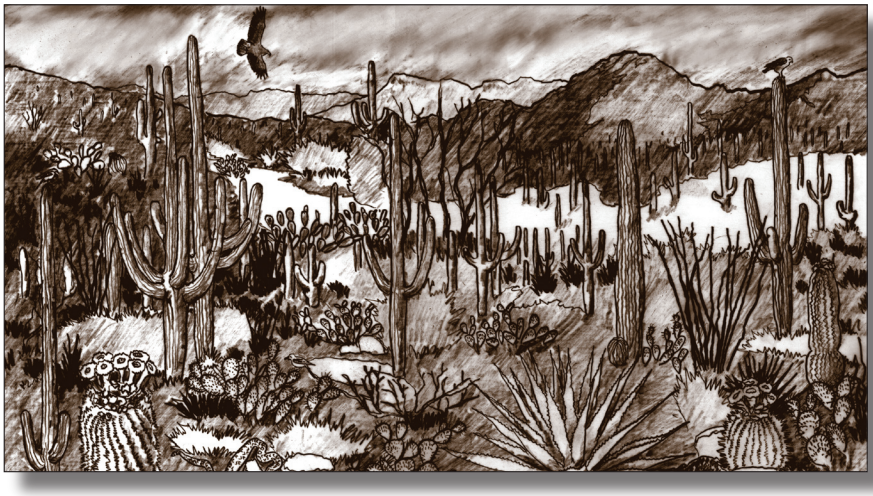
Tucson Mountain Association
Tucson Mountain Investors
Tucson Mountain Riders
Tucson Old Pueblo Credit Union
Tucson Saddle Club
Tucson Trail Runners
Tucson Volkssport Walking Klub
U S Bank National Association
Udall Center for Study of Public Policy
University Of Arizona
University Of Arizona, School of Renewable Resources
Urban Trails Coalition
Vail School District, Vail, AZ
Voyager Resort Hiking Club
Wagon Wheel Liquors, Inc.
Walking the World
Western National Parks Association
Westland Resources
White Stallion Ranch
Wild Horse Ranch Estates HOA
Wilderness Watch
Wildlands Project
Wrong Mountain Wildlife Reserve
X-9 Ranch Owners Association

INDIVIDUALS

The list of individuals is available from park headquarters.







Appendixes, Bibliography, Preparers, and Index

APPENDIX A: LEGISLATION

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

A PROCLAMATION

[No. 2032—Mar. 1, 1933—47 Stat. 2557]

WHEREAS a certain area within the Catalina Division of the Coronado National Forest in the State of Arizona and certain adjacent lands are of outstanding scientific interest because of the exceptional growth thereon of various species of cacti, including the so-called giant cactus, it appears that the public interest will be promoted by reserving as much land as may be necessary for the proper protection thereof as a national monument.

NOW, THEREFORE, I, Herbert Hoover, President of the United States of America, by virtue of the power in me vested by section 2 of the act of Congress approved June 8, 1906 (34 Stat. 225), entitled "AN ACT For the preservation of American antiquities," do proclaim that there are hereby reserved from all forms of appropriation under the public land laws, subject to all valid existing rights, and the right of the State of Arizona to select for the use of the University of Arizona all or any portions of secs. 11, 14, 22, 28, and E.½ 21, T. 14 S., R. 16 E. of the Gila and Salt River meridian, and set apart as a national monument, the following-described tracts of lands in the State of Arizona:

GILA AND SALT RIVER MERIDIAN

T. 14 S., R. 16 E., secs. 8 to 17 inclusive, secs. 20 to 29 inclusive, and secs. 32 to 36 inclusive.
T. 14 S., R. 17 E., secs. 7 to 36 inclusive.
T. 14 S., R. 18 E., secs. 7, 8, 9, secs. 16 to 21 inclusive, and secs. 28 to 33 inclusive.
T. 15 S., R. 16 E., secs. 1 to 5 inclusive.
T. 15 S., R. 17 E., secs. 1 to 6 inclusive and secs. 11, 12, 13, 14, 23, and 24.
T. 15 S., R. 18 E., secs. 4 to 9 inclusive and secs. 16 to 21 inclusive.

The reservation made by this proclamation is not intended to prevent the use of the lands now within the Coronado National Forest for national-forest purposes under the proclamation establishing the Coronado National Forest, and the two reservations shall both be effective on the land withdrawn; but the national monument hereby established shall be the dominant reservation, and any use of the land which interferes with the preservation or protection as a national monument is hereby forbidden.

Warning is hereby given to all unauthorized persons not to appropriate, injure, deface, remove, or destroy any feature of this national monument, or to locate or settle on any of the lands reserved by this proclamation.

IN WITNESS WHEREOF, I have hereunto set my hand and caused the seal of the United States to be affixed.

DONE at the City of Washington this 1 day of March, in the year of our Lord nineteen hundred and thirty-three, and of the Ind
[SEAL] pendence of the United States of America the one hundred a fifty-seventh.

HERBERT HOOVER.

By the President:
HENRY L. STIMSON,
Secretary of State.

40. Saguaro

No. 3439

November 15, 1961, 76 Stat. 1437, 16 U.S.C. 431 note
26 F.R. 10899

ENLARGING THE SAGUARO NATIONAL MONUMENT,* ARIZONA

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA
A PROCLAMATION

WHEREAS an area in Arizona possessing outstanding scientific interest because of its exceptional growth of various species of cacti has been established as the Saguaro National Monument by Proclamation No. 2032 of March 1, 1933; and

WHEREAS it appears that it would be in the public interest to add to the Saguaro National Monument certain lands lying within what is known as the Tucson Mountain Park which contain a remarkable display of relatively undisturbed lower Sonoran desert vegetation, including a saguaro stand which equals or surpasses saguaro stands elsewhere in the Nation; and

WHEREAS the addition of these lands to the monument appears essential for their effective preservation and interpretation and for the implementation of the purposes of the Saguaro National Monument; and

WHEREAS the Advisory Board on National Parks, Historic Sites, Buildings and Monuments, established pursuant to the act of August 21, 1935, 49 Stat. 666 (16 U.S.C. 463),[1] impressed by the remarkable diversity of desert vegetation of this area and its significant wildlife qualities, has recommended its preservation by adding it to the Saguaro National Monument:

NOW, THEREFORE, I, JOHN F. KENNEDY, President of the United States of America, by virtue of the authority vested in me by section 2 of the act of June 8, 1906, 34 Stat. 225 (16 U.S.C. 431),[2] do proclaim as follows:

Subject to valid existing rights, the lands now owned by the United States within the exterior boundaries of the following-described tracts of land are hereby added to and reserved as a part of the Saguaro National Monument; and lands owned by the State of Arizona within such boundaries shall become and be reserved as a part of that monument upon acquisition of title thereto by the United States:

GILA AND SALT RIVER MERIDIAN, ARIZONA

T. 13 S., R. 11 E.,
Sections 13, 14, 15, 21, 22, 23, 24, 25, 26, 27, 28, 34, 35 and 36
T. 13 S., R. 12 E.,
Sections 6, 7, 8, 17, 18, 19, 20, 29, 30 and 31;
comprising 15,360 acres, more or less.

The boundaries of the Saguaro National Monument are modified accordingly.

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* redesignated as Saguaro National Park on October 4, 1994.
[1] 16 U.S.C.A. § 463.
[2] 16 U.S.C.A. § 431.

23. Saguaro

An Act to provide for increases in appropriation ceilings and boundary changes in certain units of the National Park System, and for other purposes. (90 Stat. 2732) (P.L. 94–578)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

TITLE III—MISCELLANEOUS PROVISIONS

* * * * * * *

SAGUARO NATIONAL MONUMENT

SEC. 307. (a) The boundary of the Saguaro National Monument is hereby revised to include the area as generally depicted on the map entitled "Boundary Map, Saguaro National Monument, Pima County, Arizona", numbered 151–91,001–C, and dated July 1976, which map shall be on file and available for public inspection in the Offices of the National Park Service, Department of the Interior. The Secretary of the Interior may acquire property within the revised boundary by donation, purchase, transfer from any other Federal agency, exchange, or by any other means. The monument shall hereafter be administered in accordance with the Act of August 25, 1916 (39 Stat. 535; 16 U.S.C. 1 et seq.), as amended and supplemented.

(b) There is authorized to be appropriated not to exceed $1,700,000 in the acquisition of lands and interests added to the Saguaro Monument pursuant to subsection (a).

* * * * * * *

Approved October 21, 1976.

An act to designate certain lands within units of the National Park System as wilderness; to revise the boundaries of certain of those units; and for other purposes. (90 Stat. 2692) (P.L. 94–567)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in accordance with section 3(c) of the Wilderness Act (78 Stat. 890; 16 U.S.C. 1132(c)), the following lands are hereby designated as wilderness, and shall be administered by the Secretary of the Interior in accordance with the applicable provisions of the Wilderness Act.

* * * * * * *

(j) Saguaro National Monument, Arizona, wilderness comprising seventy-one thousand four hundred acres, depicted on a map entitled "Wilderness Plan, Saguaro National Monument, Arizona", numbered 151–20,003–D

and dated May 1976, to be known as the Saguaro Wilderness.

SEC. 2. A map and description of the boundaries of the areas designated in this Act shall be on file and available for public inspection in the office of the Director of the National Park Service, Department of the Interior, and in the office of the Superintendent of each area designated in the Act. As soon as practicable after this Act takes effect, maps of the wilderness areas and descriptions of their boundaries shall be filed with the Interior and Insular Affairs Committees of the United States Senate and House of Representatives, and such maps and descriptions shall have the same force and effect as if included in this Act: *Provided*, That correction of clerical and typographical errors in such maps and descriptions may be made.

SEC. 3. All lands which represent potential wilderness additions, upon publication in the Federal Register of a notice by the Secretary of the Interior that all uses thereon prohibited by the Wilderness Act have ceased, shall thereby be designated wilderness.

SEC. 6. The areas designated by this Act as wilderness shall be administered by the Secretary of the Interior in accordance with the applicable provisions of the Wilderness Act governing areas designated by that Act as wilderness areas, except that any reference in such provisions to the effective date of the Wilderness Act shall be deemed to be a reference to the effective date of this Act, and, where appropriate, any reference to the Secretary of Agriculture shall be deemed to be a reference to the Secretary of the Interior.

* * * * * * *

Approved October 20, 1976.

1976 WILDERNESS DESIGNATION

PUBLIC LAW 94-567 [H.R. 13160]

NATIONAL PARK SYSTEM WILDERNESS DESIGNATED

Wilderness areas Designation. 16 USC 1132 note

An act to designate certain lands within units of the National Park System as wilderness; to revise the boundaries of certain of those units; and for other purposes. (90 Stat. 2692) (P.L. 94–567)

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in accordance with section 3(c) of the Wilderness Act (78 Stat. 890; 16 U.S.C. 1132(c)), the following lands are hereby designated as wilderness, and shall be administered by the Secretary of the Interior in accordance with the applicable provisions of the Wilderness Act.

* * * * * * *

(j) Saguaro National Monument, Arizona, wilderness comprising seventy-one thousand four hundred acres, depicted on a map entitled "Wilderness Plan, Saguaro National Monument. Arizona", numbered 151–20,003–D and dated May 1976, to be known as the Saguaro Wilderness.

SEC. 2. A map and description of the boundaries of the areas designated in this Act shall be on file and available for public inspection in the office of the Director of the National Park Service, Department of the Interior, and in the office of the Superintendent of each area designated in the Act. As soon as practicable after this Act takes effect, maps of the wilderness areas and descriptions of their boundaries shall be filed with the Interior and Insular Affairs Committees of the United States Senate and House of Representatives, and such maps and descriptions shall have the same force and effect as if included in this Act: *Provided*, That correction of clerical and typographical errors in such maps and descriptions may be made.

SEC. 3. All lands which represent potential wilderness additions, upon publication in the Federal Register of a notice by the Secretary of the Interior that all uses thereon prohibited by the Wilderness Act have ceased, shall thereby be designated wilderness.

SEC. 6. The areas designated by this Act as wilderness shall be administered by the Secretary of the Interior in accordance with the applicable provisions of the Wilderness Act governing areas designated by that Act as wilderness areas, except that any reference in such provisions to the effective date of the Wilderness Act shall be deemed to be a reference to the effective date of this Act, and, where appropriate, any reference to the Secretary of Agriculture shall be deemed to be a reference to the Secretary of the Interior.

* * * * * * *

Approved October 20, 1976.

9. Saguaro

Public Law 103–364
103d Congress

An Act

To establish the Saguaro National Park in the State of Arizona, and for other purposes.

Oct. 14, 1994
[S. 316]

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

Saguaro National Park Establishment Act of 1994.
16 USC 410zz note.

This Act may be cited as the "Saguaro National Park Establishment Act of 1994".

SEC. 2. FINDINGS AND PURPOSE.

16 USC 410zz.

The Congress finds that—

(1) the Saguaro National Monument was established by Presidential Proclamation in 1933;

(2) the Tucson Mountain unit was established by Presidential Proclamation in 1961;

(3) in recognition of the need to provide increased protection for the monument, the boundaries of Tucson Mountain unit were expanded in 1976, and the boundaries of Rincon unit were expanded in 1991;

(4) the Tucson Mountain unit continues to face threats to the integrity of its natural resources, scenic beauty, and habitat protection for which the unit was established;

(5) these threats impede opportunities for public enjoyment, education, and safety within the monument, as well as opportunities for solitude within the wilderness areas of the monument designated by Congress in 1976;

(6) the residential and commercial growth of the greater Tucson, Arizona metropolitan area is causing increasing threats to the monument's resources; and

(7) the Tucson Mountain unit should be enlarged by the addition of adjacent lands of National Park caliber and Saguaro National Monument should be afforded full recognition and statutory protection as a National Park.

SEC. 3. ESTABLISHMENT OF SAGUARO NATIONAL PARK.

16 USC 410zz-1.

16 USC 431 note.

There is hereby established the Saguaro National Park (hereinafter in this Act referred to as the "park") in the State of Arizona. The Saguaro National Monument is abolished as such, and all lands and interests therein are hereby incorporated within and made part of Saguaro National Park. Any reference to Saguaro National Monument shall be deemed a reference to Saguaro National Park, and any funds available for the purposes of the monument shall be available for purposes of the park.

16 USC 410zz-2.

SEC. 4. EXPANSION OF PARK BOUNDARIES.

(a) IN GENERAL.—The boundaries of the park are hereby modified to reflect the addition of approximately 3,460 acres of land and interests therein as generally depicted on the map entitled "Saguaro National Monument Additions" and dated April, 1994.

(b) LAND ACQUISITION.—(1) Within the lands added to the park pursuant to subsection (a), the Secretary is authorized to acquire lands and interests therein by donation, purchase with donated or appropriated funds, transfer, or exchange: *Provided*, That no such lands or interests therein may be acquired without the consent of the owner thereof unless the Secretary determines that the land is being developed, or is proposed to be developed in a manner which is detrimental to the integrity of the Park.

(2) Lands or interests therein owned by the State of Arizona or a political subdivision thereof may only be acquired by donation or exchange.

(c) WITHDRAWAL.—Subject to valid existing rights, all Federal lands within the park are hereby withdrawn from all forms of entry, appropriation, or disposal under the public land laws, from location, entry, or patent under the United States mining laws, and from disposition under all laws relating to mineral and geothermal leasing, and mineral materials, and all amendments thereto.

16 USC 410zz-3.

SEC. 5. AUTHORIZATION OF APPROPRIATIONS.

There is authorized to be appropriated such sums as may be necessary to carry out this Act.

Approved October 14, 1994.

LEGISLATIVE HISTORY—S. 316:
HOUSE REPORTS: No. 103–815 (Comm. on Natural Resources).
SENATE REPORTS: No. 103–270 (Comm. on Energy and Natural Resources).
CONGRESSIONAL RECORD, Vol. 140 (1994):
June 16, considered and passed Senate.
Oct. 3, considered and passed House.

5. Saguaro

Public Law 102–61
102d Congress

An Act

To expand the boundaries of the Saguaro National Monument.

June 19, 1991
[S. 292]

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

Saguaro National Monument Expansion Act of 1991.
Arizona.
Natural resources.
16 USC 431 note.

SECTION 1. SHORT TITLE.

This Act may be cited as the "Saguaro National Monument Expansion Act of 1991".

16 USC 431 note.

SEC. 2. FINDINGS AND PURPOSE.

(a) FINDINGS.—The Congress finds that the area generally to the south of the Rincon unit of the Saguaro National Monument contains—

(1) prime Sonoran desert habitat including an exceptionably rich area of Saguaro cactus and palo verde uplands;

(2) an outstanding riparian corridor of large Arizona sycamores and cottonwoods;

(3) important archaeological and cultural sites; and

(4) important habitat for the desert tortoise, gila monster, javelina, and other species of reptiles, mammals, and birds.

(b) PURPOSE.—The purpose of this Act is to authorize the addition of approximately 3,540 acres to the Rincon unit of the Saguaro National Monument in order to protect, preserve, and interpret the monument's resources, and to provide for the education and benefit of the public.

16 USC 431 note.

SEC. 3. DEFINITIONS.

As used in this Act, the term—

(1) "expansion area" means the approximately 3,540 acres to be added to the monument pursuant to this Act;

(2) "monument" means the Saguaro National Monument; and

(3) "Secretary" means the Secretary of the Interior.

16 USC 431 note.

SEC. 4. EXPANSION OF MONUMENT BOUNDARIES.

(a)(1) IN GENERAL.—The monument boundaries are hereby revised to include the approximately 3,540 acres of lands and interests in land as generally depicted on the map entitled "Saguaro National Monument Enhanced Boundary", numbered 151/91,001-D, and dated September 1990.

(2) The map referred to in paragraph (1) shall be on file and available for public inspection in the offices of the National Park Service, Department of the Interior.

(b) ACQUISITION OF LANDS.—The Secretary is authorized to acquire lands and interests in lands within the monument boundary by donation, purchase with donated or appropriated funds, exchange, or transfer from another Federal agency, except that lands or interests therein owned by the State of Arizona or any political subdivision thereof may be acquired only by donation or exchange.

105 STAT. 304

(c) ADMINISTRATION.—Lands and interests in lands acquired pursuant to this Act shall be administered as part of the monument and shall be subject to all laws applicable to the monument.

(d) AMENDMENT TO GENERAL MANAGEMENT PLAN.—Within one year after the date of enactment of this Act, the Secretary is directed to amend the monument's general management plan with respect to the use and management of the expansion area.

16 USC 431 note.

SEC. 5. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated such sums as may be necessary to carry out this Act.

Approved June 19, 1991.

LEGISLATIVE HISTORY—S. 292:
HOUSE REPORTS: No. 102–88 (Comm. on Interior and Insular Affairs).
SENATE REPORTS: No. 102–44 (Comm. on Energy and Natural Resources).
CONGRESSIONAL RECORD, Vol. 137 (1991):
Apr. 25, considered and passed Senate.
June 3, considered and passed House.

APPENDIX B: SERVICEWIDE MANDATES AND POLICIES

As summarized in the "Servicewide Laws and Policies" discussion, the alternatives considered in this document incorporate and comply with the provisions of the following mandates and policies as funding and staffing allow. Conditions prescribed by servicewide mandates and policies that are particularly important to this document are summarized below. These mandates and policies illustrate that a general management plan is not needed to decide, for instance, that it is appropriate to protect endangered species, control exotics species, protect archeological sites, conserve artifacts, or provide for handicapped access. Those and other things are already laws, mandates, or policies.

Relations with Private and Public Organizations, Owners of Adjacent Land, and Governmental Agencies

RELATIONS WITH PRIVATE AND PUBLIC ORGANIZATIONS, OWNERS OF ADJACENT LAND, AND GOVERNMENTAL AGENCIES

Current laws and policies require that the following conditions be achieved in the park:

Desired Condition	Source
The national park is managed as part of a greater ecological, social, economic, and cultural system. Good relations are maintained with adjacent landowners, surrounding communities, and private and public groups that affect, and are affected by, the park. The park is managed proactively to resolve external issues and concerns and ensure that park values are not compromised. Because the national park is an integral part of larger regional environment, the National Park Service works cooperatively with others to anticipate, avoid, and resolve potential conflicts, protect national park resources, and address mutual interests in the quality of life for community residents. Regional cooperation involves federal, state, and local agencies, Indian tribes, neighboring landowners, and all other concerned parties.	NPS *Management Policies 2006*

Actions

The National Park Service will take the following kinds of actions to meet legal and policy requirements related to park neighbors and other agencies:

Continue to establish and foster partnerships with public and private organizations to achieve the mission and purposes of the national park. Partnerships will be sought for resource protection, research, education, and visitor enjoyment.

NPS staff will keep landowners, land managers, local governments, and the general public informed about national park management activities. Periodic consultations will occur with landowners and communities affected by national park visitors and management actions. The National Park Service will work closely with local, state, and federal agencies and tribal governments whose programs affect or are affected by activities in the national park. NPS staff will continue their regular consultations with such entities as the Arizona state historic preservation office, the Arizona State Land Department, American Indian tribes, Pima County, Tucson, and Marana planning commissions and zoning boards, the Bureau of Land Management, the U.S. Forest Service, the U.S. Fish and Wildlife Service, the city of Tucson, the city of Marana, the Pima County Sheriff's Department, and the Arizona State Police,.

Frequent consultations will continue to take place with the U.S. Forest Service, Customs and Border Protection, Pima County, and other property owners.

Continue to establish and foster partnerships with public and private organizations to achieve the purposes and mission of the park. Partnerships will be sought for resource protection, research, education, and visitor enjoyment purposes.

To foster a spirit of cooperation with neighbors and encourage compatible adjacent land uses, park staff will keep landowners, land managers, local governments, and the public informed about park management activities. Periodic consultations will occur with landowners and communities who are affected by, or potentially affected by park visitors and management actions. Park staff will respond promptly to conflicts that arise over their activities, visitor access, and proposed activities and developments on adjacent lands that may affect the park. Park managers will seek agreements with landowners to encourage their lands to be managed in a manner compatible with park purposes. Park staff also will seek ways to provide landowners with technical and management assistance to address issues of mutual interest.

Work closely with local, state, federal agencies, and tribal governments whose programs affect, or are affected by, activities in the park. The National Park Service will continue to coordinate with the Pima County Association of Governments, and with other local, state, and federal agencies. In particular, park managers will maintain a close working relationship with Pima County and the U.S. Forest Service, whose lands abut much of the park, to meet mutual management needs. Park managers also will pursue cooperative regional planning whenever possible to integrate the park into issues of regional concern.

BOUNDARY ADJUSTMENTS	
Desired Condition	Source
As part of the planning process, the National Park Service identifies and evaluates boundary adjustments that may be necessary or desirable in order to carry out the purposes of the park unit. The boundary of a national park may be modified only as authorized by law.	NPS *Management Policies 2006*
Actions	
Boundary adjustments may be recommended for the following reasons:	
Protect significant resources and values, or to enhance opportunities for public enjoyment related to park purposes; Address operational and management issues, such as the need for access or the need for boundaries to correspond to logical boundary delineations such as topographic or other natural features or roads; or Otherwise protect park resources that are critical to fulfilling park purposes.	

Government-to-Government Relations between American Indian Tribes and Saguaro National Park

GOVERNMENT-TO-GOVERNMENT RELATIONS BETWEEN AMERICAN INDIAN TRIBES AND SAGUARO NATIONAL PARK	
Current laws and policies require that the following conditions be achieved in the park:	
Desired Condition	Source
The National Park Service and tribes culturally affiliated with the park maintain positive, productive, government-to-government relationships. Park managers and staff respect the viewpoints and needs of the tribes, continue to promptly address conflicts that occur, and consider American Indian values in park management and operation.	NPS Organic Act, American Indian Religious Freedom Act, National Historic Preservation Act, Archeological Resources Protection Act, Native American Graves Protection and Repatriation Act, NPS *Management Policies 2006*, Executive Order 13007 "Sacred Sites," The National Environmental Policy Act
Actions	
The National Park Service will take the following kinds of actions to meet legal and policy requirements related to park neighbors and other agencies:	
Continue regular consultations with affiliated tribes to continue to improve communications, resolve any problems or misunderstandings, and identify traditional-use resources. Continue to encourage the employment of American Indians on park staff to improve communications and working relationships, and encourage cultural diversity in the workplace. Consider culturally affiliated tribal values in efforts to improve overall management and park interpretation. Implement a joint monitoring program to monitor plant-gathering sites for potential impacts.	

Natural Resource Management Requirements

AIR QUALITY The park is designated as a class I air quality area. Current laws and policies require that the following conditions be achieved in the park.	
Desired Condition	**Source**
Air quality in the park meets national ambient air quality standards for specified pollutants. The park's air quality is maintained or enhanced with no significant deterioration. Nearly unimpaired views of the landscape both within and outside the park are present. Scenic views are substantially unimpaired.	Clean Air Act, NPS Organic Act, NPS *Management Policies 2006;* NPS-77, "Natural Resources Management Guidelines"
Actions The National Park Service will take the following kinds of actions to meet legal and policy requirements related to air quality.	
Although the National Park Service has very little direct control over air quality in the air shed encompassing the park, park managers will continue to cooperate with the Pima County Department of Environmental Quality and the U.S. Environmental Protection Agency to monitor air quality and ensure that air quality is not impaired. Inventory the air quality-related values associated with each park. Monitor and document the condition of air quality and related values. Evaluate air pollution impacts and identify causes. Minimize air quality pollution emissions associated with park operations, including the use of prescribed fire and visitor use activities. Conduct air quality monitoring in conjunction with other government agencies. Conduct park operations in compliance with federal, state, and local air quality regulations. Ensure healthful indoor air quality at NPS facilities. Participate in federal, regional, and local air pollution control plans and drafting of regulations and review permit applications for major new air pollution sources Maintain constant dialogue with the Pima County Department of Environmental Quality regarding visibility conditions at the park. Participate with the NPS-WASO Air Resources Division on the regional planning group that includes the Sonoran Desert Vital Signs Network was formed to address regional haze issues in Arizona and New Mexico. Reduce emissions associated with administrative and recreational uses. Develop educational programs to inform visitors and regional residents about the threats of air pollution. Form regional partnerships to develop alternative transportation systems and promote clean fuels. Participate in research on air quality and effects of air pollution. Determine changes in ecosystem function caused by atmospheric deposition and assess the resistance and resilience of native ecosystems in the face of these external perturbations. Research effects of atmospheric deposition on plants, soils, and wetlands in the park.	

BACKCOUNTRY	
The National Park Service will manage backcountry areas for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment.	
Desired Condition	**Source**
Backcountry use is managed in accordance with a backcountry management plan (or other plan addressing backcountry uses) that is designed to avoid unacceptable impacts on park resources or adverse effects on visitor enjoyment of appropriate recreational experiences. The Park Service seeks to identify acceptable limits of impacts, monitors backcountry use levels and resource conditions, and takes prompt corrective action when unacceptable impacts occur.	NPS *Management Policies 2006*
Actions	
The National Park Service will take the following kinds of actions to comply with the policies mentioned above.	
The park's backcountry management plan will be updated to avoid unacceptable impacts on park resources or adverse effects on visitor enjoyment of appropriate recreational experiences. Special attention will be paid to occupancy limits in primitive campsites and the primitive and semi-primitive management zones.	

ECOSYSTEM MANAGEMENT	
Current laws and policies require that the conditions delineated below be achieved in the park:	
Desired Condition	**Source**
The park is managed holistically, as part of a greater ecological, social, economic, and cultural system.	NPS *Management Policies 2006*
Actions	
The National Park Service will take the following kinds of actions to meet legal and policy requirements related to ecosystem management:	
Continue to seek cooperative agreements with the U.S. Forest Service, the state of Arizona, Pima County, and other adjacent land managing agencies to protect ecosystem habitat and wildlife corridors. Continue to develop cooperative agreements, partnerships, and other feasible arrangements to set an example in resource conservation and innovation, and to facilitate research related to park resources and their management. Work collaboratively with the landowners inside and outside the park to protect viewsheds leading into and in the park and seen from inside the park. Use cooperative agreements, conservation easements, donation, land exchanges, cooperatively produced management plans, boundary adjustments, or other tools to accomplish the protection of the fundamental park resources and values.	

EXOTIC SPECIES Current laws and policies require that the following conditions be achieved in the park:	
Desired Condition	**Source**
The management of populations of exotic plant and animal species, up to and including eradication, are undertaken wherever such species threaten park resources or public health and when control is prudent and feasible.	NPS *Management Policies 2006*; EO 13112, "Invasive Species"; NPS-77, "Natural Resources Management Guidelines"
Actions The National Park Service will take the following kinds of actions to meet legal and policy requirements related to exotic species.	
Complete an inventory of plants and animals in the park and regularly monitor the distribution and condition (e.g., health, disease) of selected species that are (a) invasive exotics or (b) native species capable of creating resource problems (e.g., habitat decline due to overpopulation). Develop a long-term program for reversing the destructive effects of exotic species. Study the environmental and ecological effects of exotic species invasion to assess threats and prioritize management actions. Undertake research to assess the methods by which exotic species become established and spread into native plant communities so that strategies for preventing introduction and establishment can be developed and implemented. Manage exclusively for native plant species in pristine and primitive management prescriptions. In other management prescriptions, limit planting of nonnative species to noninvasive plants that are justified by the historic scene or operational needs. Control or eliminate exotic plants and animals, exotic diseases, and pest species where there is a reasonable expectation of success and sustainability. Base control efforts on: the potential threat to legally protected or uncommon native species and habitats the potential threat to visitor health or safety the potential threat to scenic and aesthetic quality the potential threat to common native species and habitat Manage exotic diseases and pest species based on similar priorities. Provide interpretive and educational programs on the preservation of native species for visitors and for residents neighboring the park.	

FIRE MANAGEMENT Current laws and policies require that the following conditions be achieved in the park:	
Desired Condition	**Source**
Park fire management programs are designed to meet resource management objectives prescribed for the various areas of the park and to ensure that the safety of firefighters and the public are not compromised.	NPS *Management Policies 2006;* DO 41, "Wilderness Preservation and Management"
All wildland fires are effectively managed, considering resource values to be protected and firefighter and public safety, using the full range of strategic and tactical operations as described in an approved fire management plan.	NPS *Management Policies 2006*
Actions The National Park Service will take the following kinds of actions to meet legal and policy requirements related to management of fire:	
Maintain a current fire management plan to reflect changes in wildland fire policy, fire use applications, and the body of knowledge on fire effects within the park's vegetation types. Maintain a cooperative agreement for fire suppression with appropriate federal, tribal, state, and local agencies and organizations. To provide information on whether specified objectives for prescribed fires are met, monitoring programs are instituted for such fires to record fire behavior, smoke behavior, fire decisions, and fire effects. Conduct research and monitor the effects of fire to ensure that resource objectives are met. Use fire as a management tool to maintain native plant communities and control exotic species. Provide visitors information so that they can learn the role of fire in the ecosystem.	

FLOODPLAINS Current laws and policies require that the conditions delineated below be achieved in the park:	
Desired Condition	Source
Natural floodplain values are preserved or restored.	EO 11988 "Floodplain Management"; Rivers and Harbors Act; NPS *Management Policies 2006;* Special Directive 93-4 "Floodplain Management, Revised Guidelines for National Park Service Floodplain Compliance" (1993);
Long-term and short-term environmental effects associated with the occupancy and modification of floodplains are avoided.	DO 77-2, "Floodplain Management"; National Flood Insurance Program (44 CFR 60); Special Directive 93-4 "Floodplain Management, Revised Guidelines for National Park Service Floodplain Compliance" (1993)
When it is not practicable to locate or relocate development or inappropriate human activities to a site outside the floodplain or where the floodplain will be affected, the National Park Service • Prepares and approves a statement of findings in accordance with DO 77-2. • Uses nonstructural measures as much as practicable to reduce hazards to human life and property while minimizing impacts on the natural resources of floodplains. • Ensures that structures and facilities are designed to be consistent with the intent of the standards and criteria of the National Flood Insurance Program (44 CFR 60).	NPS *Management Policies 2006*, Special Directive 93-4 "Floodplain Management, Revised Guidelines for National Park Service Floodplain Compliance" (1993)
Actions The National Park Service will take the following kinds of actions to meet legal and policy requirements related to floodplains:	
Any future construction in the 500-year floodplain will be accompanied by a statement of findings describing the need to develop within the maximum estimated flood (Q_{me}), the flood hazard associated with the proposed development site, and the plans for mitigation of this flood hazard. Visitors, including those hiking, parking, and picnicking in or near small channels, would be made aware of hazards associated with flash flooding and informed of what to do when water is flowing in low-water road crossings.	

GENERAL NATURAL RESOURCES / RESTORATION Current laws and policies require that the following conditions be achieved in the park:	
Desired Condition	**Source**
Native species populations that have been severely reduced in or extirpated from the park are restored where feasible and sustainable.	NPS *Management Policies 2006*; NPS-77, "Natural Resources Management Guidelines"
Populations of native plant and animal species function in as natural condition as possible except where special considerations are warranted.	
Actions The National Park Service will take the following kinds of actions to meet legal and policy requirements related to protection and restoration of native species.	
Complete an inventory of plants and animals in the park and regularly monitor the distribution and condition (e.g., health, disease) of selected species that are indicators of ecosystem condition and diversity. Develop methods to restore native biological communities. Research soil properties including nutrients, microorganisms and soil crusts to learn how to restore native plant communities. Determine source of soil nutrients and the effects of atmospheric pollution on soils and soil biological crusts. Continue annual mountain lion monitoring strategies; develop and institute a food source monitoring strategy to identify periods when insufficient food is available. Determine the frequency and extent of human-caused lion mortality in the park lion population due to administrative actions. Determine genetic integrity and viability of the mountain lion population through DNA analysis. Monitor desert tortoise population movements, habitat use, reproduction and predation. Determine threats to population growth and recolonization of park habitat.	

GEOLOGIC RESOURCES Current laws and policies require that the following conditions be achieved in the park:	
Desired Condition	**Source**
The park's geologic resources are preserved and protected as integral components of the park's natural systems.	NPS *Management Policies 2006;* NPS-77, "Natural Resources Management Guidelines"
The Park Service manages caves and karst in accordance with approved cave management plans to perpetuate the natural systems associated with the caves and karst.	NPS *Management Policies 2006;* NPS-77, "Natural Resources Management Guidelines"
Actions The National Park Service will take the following kinds of actions to meet legal and policy requirements related to geologic resources:	
Assess the impacts of natural processes and human-related events on geologic resources. Maintain and restore the integrity of existing geologic resources. Integrate geologic resource management into NPS operations and planning. Interpret geologic resources for visitors. Manage caves in accordance with approved cave management plans to perpetuate the natural systems associated with the caves. Partner with the U.S. Geological Survey and others to identify, address, and monitor geologic hazards. Develop programs to educate visitors about geologic resources. Collect baseline information on surficial geologic resources. Develop a plan to address geologic research, inventory, and monitoring. Update geologic map of the park in digital format that can be used in the park's geographic information system (GIS). Update geologic history of the park, using modern theory and techniques. Update geologic interpretations of localities that are the subject of interpretive stops or displays. Prepare a geologic inventory, including the identification of the significant geologic processes that shape park ecosystems and the identification of the human influences on those geologic processes (i.e., "geoindicators"); identification of geologic hazards; inventory of type sections or type localities within the park; inventory of "textbook" localities that provide particularly good or well-exposed examples of geologic features or events, and that may warrant special protection or interpretive efforts; and, identification of interpretive themes or other opportunities for interpreting the significant geologic events or processes that are preserved, exposed, or occur in the park. Prepare a cave survey, including maps, locations, and assessments of park caves, using NPS protocols. Prepare a cave management plan.	

LAND PROTECTION The National Park Service will manage for protection of park lands.	
Desired Condition	**Source**
Land protection plans are prepared to determine and publicly document what lands or interests in land need to be in public ownership, and what means of protection are available to achieve the purposes for which the national park was created.	NPS *Management Policies 2006*
Actions The National Park Service will take the following kinds of actions to comply with the policies mentioned above.	
• Prepare a land protection plan for the park.	

LIGHTSCAPE MANAGEMENT / NIGHT SKY	
The park's night sky is a feature that contributes to visitors' experiences. Current laws and policies require that the following conditions be achieved in the park:	
Desired Condition	**Source**
Excellent opportunities to see the night sky are available. Artificial light sources both within and outside the park do not unacceptably adversely affect opportunities to see the night sky.	NPS *Management Policies 2006*
Actions	
The National Park Service will take the following kinds of actions to comply with the policy mentioned above:	
The National Park Service will cooperate with park visitors, neighbors, and local government agencies to find ways to prevent or minimize the intrusion of artificial light into the night scene in the park. In natural areas, artificial outdoor lighting will be limited to basic safety requirements and will be shielded when possible. The park staff will evaluate the impacts on the night sky caused by park facilities. If light sources in the park are affecting night skies, the staff will study alternatives such as shielding lights, changing lamp types, or eliminating unnecessary sources.	

NATIVE VEGETATION AND ANIMALS	
Current laws and policies require that the following conditions be achieved in the park:	
Desired Condition	**Source**
The National Park Service will maintain as parts of the natural ecosystem, all native plants and animals in the park.	NPS *Management Policies 2006;* NPS-77 "Natural Resources Management Guideline"
Actions	
The National Park Service will take the following kinds of actions to meet legal and policy requirements related to native wildlife and vegetation:	
Complete inventory of the plants and animals in the park and regularly monitor the distribution and condition of selected species that are indicators of ecosystem condition and diversity. Develop methods to restore native biological communities. Minimize human impacts on native plants, animals, populations, communities and ecosystems and the processes that sustain them. Restore native plant and animals populations in the park that have been extirpated by past human-caused action, where feasible. Whenever possible, natural processes will be relied upon to maintain native plant and animal species, and to influence natural fluctuations in populations of these species. Protect a full range of genetic types (genotypes) of native plant and animals populations in the park by perpetuating natural evolutionary processes and minimizing human interference with evolving genetic diversity.	

SOUNDSCAPES

An important part of the NPS mission is to preserve or restore the natural soundscapes associated with national park system units. The sounds of nature are among the intrinsic elements that combine to form the environment of our national park system units. Current laws and policies require that the following conditions be achieved in the park:

Desired Condition	Source
The National Park Service preserves the natural ambient soundscapes, restores degraded soundscapes to the natural ambient condition wherever possible, and protects natural soundscapes from degradation due to human-caused noise. Disruptions from recreational uses are managed to provide a high-quality visitor experience in an effort to preserve or restore the natural quiet and natural sounds.	NPS *Management Policies 2006,* DO 47,"Sound Preservation and Noise Management"
Noise sources are managed to preserve or restore the natural soundscape.	Executive memorandum signed by President Clinton on April 22, 1996

Actions

The National Park Service will take the following kinds of actions to comply with the policies mentioned above.

- Actions will be taken to monitor and minimize or prevent or minimize unnatural sounds that adversely affect park resources or values or visitors' enjoyment of them.
- The park staff continues to require tour bus companies to comply with regulations designed to reduce noise levels (e.g., turning off engines when buses are parked).
- Noise generated by NPS management activities will be minimized by strictly regulating administrative functions such as the use of motorized equipment. Noise will be a consideration in the procurement and use of equipment by the park staff.
- Work with the Department of Defense to address problems from military flights.
- Work with tour operators and all other interested parties to develop an air tour management plan. The National Park Service will continue to work with the Federal Aviation Administration, tour operators, commercial businesses, and general aviation interests to encourage aircraft to fly around the park, especially for those flights where the presence of the park is incidental to the purpose of the flight (i.e., transit between two points). Actions that might be considered to encourage pilots to fly outside the park include identifying the park on route maps as a noise-sensitive area, educating pilots about the reasons for keeping a distance from the park, and encouraging pilots to comply with FAA regulations and advisory guidance, in a manner that will minimize noise and other impacts.
- Encourage visitors to avoid unnecessary noise, such as through the use of generators and maintaining quiet hours in the campgrounds.

SOILS Current laws and policies require that the following conditions be achieved in the park:	
Desired Condition	**Source**
The National Park Service actively seeks to understand and preserve the soil resources of the park, and to prevent, to the extent possible, the unnatural erosion, physical removal, or contamination of the soil, or its contamination of other resources.	NPS *Management Policies 2006;* NPS-77 "Natural Resources Management Guideline"
Natural soil resources and processes function in as natural a condition as possible, except where special considerations are allowable under policy.	NPS *Management Policies 2006;* NPS-77, "Natural Resources Management Guidelines"
Actions The National Park Service will take the following kinds of actions to meet legal and policy requirements related to soils:	
Update soils map of the park in digital format that can be used in the park's geographic information system (GIS). Whenever possible, park staff would educate visitors about soils. Collect baseline information on soils. Take actions to prevent — or if that is not possible, to minimize — adverse, potentially irreversible impacts on soils. Possibly implement soil conservation and soil amendment practices to reduce impacts, and import off-site soil or use soil amendments to restore damaged sites. Off-site soil normally is salvaged soil, not soil removed from pristine sites, unless the use of pristine site soil can be achieved without causing any unacceptable adverse impacts on the overall ecosystem. When use of a soil fertilizer or other soil amendment is an unavoidable part of restoring a natural landscape or maintaining an altered plant community, use is guided by a written prescription. The prescription ensures that such use of soil fertilizer or soil amendment does not unacceptably alter the physical, chemical, or biological characteristics of the soil, biological community, or surface or ground waters. Minimize soil excavation, erosion, and off-site soil migration during and after any ground-disturbing activity. Survey areas of the park with soil resource problems and take actions appropriate to the management prescription to prevent or minimize further erosion, compaction, or deposition. Apply effective best management practices to problem soil erosion and compaction areas in a manner that stops or minimizes erosion, restores soil productivity, and reestablishes or sustains a self-perpetuating vegetative cover.	

THREATENED AND ENDANGERED SPECIES AND SPECIES OF CONCERN Current laws and policies require that the following conditions be achieved in the park:	
Desired Condition	**Source**
Federally listed and state-listed threatened and endangered species and their habitats are protected and sustained.	Endangered Species Act; equivalent state protective legislation; NPS *Management Policies 2006;* NPS-77, "Natural Resources Management Guidelines"
Native threatened and endangered species populations that have been severely reduced in or extirpated from the park are restored where feasible and sustainable.	
Actions The National Park Service will take the following kinds of actions to meet legal and policy requirements related to species of special concern:	
Support research that contributes to management knowledge of rare and protected species and their habitat. To protect rare or protected species and their habitat, complete an inventory of rare or protected plants and animals in the park and regularly monitor the distribution and condition (e.g., health, disease). Modify management plans to be more effective based on the results of monitoring. Cooperate with the U.S. Fish and Wildlife Service and NOAA-Fisheries, as appropriate, to ensure that NPS actions comply with the Endangered Species Act. Survey for, protect, and strive to recover all species native to the park that are listed under the Endangered Species Act. Participate in the recovery planning process when appropriate. Manage designated critical habitat, essential habitat, and recovery areas to maintain and enhance their value for listed species. To the greatest extent possible, inventory, monitor, and manage state and locally listed species in a manner similar to federally listed species. Continue to work with the U.S. Fish and Wildlife Service to explore options to reintroduce species extirpated from the park (e.g., Gila topminnow).	

WATER RESOURCES Current laws and policies require that the conditions delineated below be achieved in the park:	
Desired Condition	**Source**
Surface water and groundwater are protected and water quality meets or exceeds all applicable water quality standards.	Clean Water Act; Executive Order (EO) 11514 "Protection and Enhancement of Environmental Quality"; NPS *Management Policies 2006;* NPS-77, "Natural Resources Management Guidelines"
NPS and NPS-permitted programs and facilities are maintained and operated to avoid pollution of surface water and groundwater.	Clean Water Act; EO 12088, "Federal Compliance with Pollution Control Standards"; Rivers and Harbors Act; NPS *Management Policies 2006;* NPS-77, "Natural Resources Management Guidelines"

Actions

The National Park Service will take the following kinds of actions to meet legal and policy requirements related to water resources:

- Work with appropriate governmental bodies to obtain the highest possible water quality standards available under the Clean Water Act.
- Cooperate with other government agencies to maintain and/or restore quantity and quality of park water resources.
- Take all necessary actions to maintain or restore the quantity and quality of surface and ground waters in the park consistent with the Clean Water Act.
- Determine means to protect and preserve acceptable stream flows, spring flows, and ground water levels under state law, federal law, and agreements.
- Determine acceptable stream flows, spring flows, and ground-water levels to sustain aquatic and bottomland life and provide recreational opportunities.
- Pursue methods to preserve and protect acceptable stream flows, spring flows, and ground-water levels.
- Promote research to improve understanding of water resources in the park, including further studies of sedimentation, mountain recharge, water budgets, and other important baseline data for which we lack information.
- Investigate and monitor water quality including salinity and trace elements. Study the effects of the water quality on aquatic life.
- Promote water conservation, and the role of the Rincon wilderness watershed in providing high-quality water to the Tucson Basin, by the National Park Service, partners, concessioners, visitors, and park neighbors.
- Apply best management practices to all pollution-generating activities and facilities in the park, such as NPS maintenance and storage facilities and parking areas.
- Minimize the use of pesticides, fertilizers, and other chemicals and manage them in keeping with NPS policy and federal regulations.
- Continue to monitor stream flows, spring flows, ground-water levels, and water quality.
- Continue to work with Coronado National Forest and Las Cienegas National Conservation Area.
- Work with other entities to determine the effects of NPS activities on aquifers of Saguaro National Park, Coronado National Forest, Las Cienegas National Conservation Area, Tucson Mountain County Park, and gateway communities.
- Promote, with the assistance of other agencies, the development of pretreatment programs for existing and new maquiladora facilities.
- Press for continued and expanded monitoring to fulfill the database requirements to determine unknown water quantity and quality issues.
- Continue to evaluate issues and concerns identified in the 1997 "Water Resources Scoping Report" for Saguaro National Park.
- Continue to monitor the effects of visitor use on water resources.
- Continue to assess effects of stormwater runoff.
- Promote greater public understanding of water resource issues at Saguaro National Park and encourage public support for and participation in protecting the Santa Cruz River Basin watershed.
- Pursue unique waters classification of the Madrona Pools by Arizona Department of Water Quality.

WETLANDS Current laws and policies require that the conditions delineated below be achieved in the park:	
Desired Condition	**Source**
The natural and beneficial values of wetlands are preserved and enhanced.	Clean Water Act; EO 11990; "Protection of Wetlands"; NPS *Management Policies 2006;* DO 77-1, "Wetland Protection"; Rivers and Harbors Act;
The National Park Service implements a "no net loss of wetlands" policy and strives to achieve a longer-term goal of net gain of wetlands across the national park system through the restoration of previously degraded wetlands.	DO 77-1, "Wetland Protection"; EO 11514 "Protection and Enhancement of Environmental Quality," NPS *Management Policies 2006*
The National Park Service avoids to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and avoids direct or indirect support of new construction in wetlands wherever there is a practicable alternative.	EO 11990; "Protection of Wetlands," NPS *Management Policies 2006*
The National Park Service compensates for remaining unavoidable adverse impacts on wetlands by restoring wetlands that have been previously degraded.	"Protecting America's Wetlands: A Fair, Flexible, and Effective Approach," White House Office on Environmental Policy, 1993; NPS 77-1, "Wetland Protection," NPS *Management Policies 2006*
Actions The National Park Service will take the following kinds of actions to meet legal and policy requirements related to wetland resources:	
All facilities would be located to avoid wetlands if feasible. If avoiding wetlands was not feasible, other actions would be taken to comply with Executive Order 11990 ("Protection of Wetlands"), the Clean Water Act, and Director's Order 77-1 ("Wetland Protection"). A statement of findings for wetlands will be prepared if the NPS actions would result in adverse impacts on wetlands. The statement of findings would include an analysis of the alternatives, delineation of the wetland, a wetland restoration plan to identify mitigation, and a wetland functional analysis of the impact site and restoration site. Conduct or obtain parkwide wetland inventories to ensure proper planning, management, and protection of wetlands. Enhance natural wetland values by using them for educational and scientific purposes that do not disrupt natural wetland functions. If natural wetland functions have been degraded or lost due to human action, the National Park Service will work to restore wetlands to predisturbance conditions, to the extent practicable.	

WILDERNESS	
The National Park Service will manage wilderness areas including those proposed for wilderness designation for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness.	
Desired Condition	**Source**
The park ensures that wilderness characteristics and values are retained and protected, that visitors continue to find opportunities for solitude and primitive, unconfined recreation, and that signs of people remain substantially unnoticeable.	NPS *Management Policies 2006;* DO 41 "Wilderness Preservation and Management," Wilderness Act of 1964

Actions

The National Park Service will take the following kinds of actions to comply with the policies mentioned above.

If new areas are added to a park, a wilderness suitability assessment will be prepared if appropriate. Should areas be determined suitable, a wilderness study will be prepared.

Areas proposed/recommended for wilderness will continue to be managed so as to not diminish their wilderness characteristics until Congress has taken action on the proposal/recommendation.

Uses that are in keeping with the definitions and purpose of wilderness, and do not degrade wilderness resources and character, will be encouraged. Appropriate restrictions may be imposed on any authorized activity to preserve wilderness character and resources, or to ensure public safety.

Develop and maintain a wilderness management plan or equivalent planning document to guide the preservation, management and use of these resources.

Managers considering the use of aircraft or other motorized equipment or mechanical transportation within wilderness must consider impacts to the character, aesthetics, and traditions of wilderness before considering the costs and efficiency of the equipment.

All management decisions affecting wilderness must be consistent with the minimum requirement concept: a proposed management action must be appropriate or necessary for administration of the area as wilderness and not pose a significant impact to wilderness resources and character, and the management method (tools) used must cause the least amount of impact to the wilderness resources and character. Administrative use of motorized equipment or mechanical transport will be authorized only if the superintendent determines it is the minimum requirement needed to achieve the purposes of the area as wilderness, or it is needed in an emergency situation involving the health or safety of persons actually within the area.

In evaluating environmental impacts, the National Park Service will take into account wilderness characteristics and values, including the primeval character and influence of the wilderness; the preservation of natural conditions (including the lack of man-made noise); and assurances that there will be outstanding opportunities for solitude, that the public will be provided with a primitive and unconfined type of recreational experience, and that wilderness will be preserved and used in an unimpaired condition. Managers will be expected to appropriately address cultural resources management considerations in the development and review of environmental compliance documents for actions that might impact wilderness resources.

Scientific activities will be encouraged and permitted when consistent with NPS responsibilities to preserve and manage wilderness.

Wilderness education/interpretive programs will be used to inform visitors about wilderness ethics and how to minimize their impacts on wilderness. Leave-no-trace practices will be emphasized.

Cultural Resource Management Requirements

ARCHEOLOGICAL RESOURCES Current laws and policies require that the following conditions be achieved in the parks:	
Desired Condition	**Source**
Archeological sites are identified and inventoried and their significance is determined and documented. Archeological sites are protected in an undisturbed condition unless it is determined through formal processes that disturbance or natural deterioration is unavoidable. When disturbance or deterioration is unavoidable, the site is professionally documented and excavated and the resulting artifacts, materials, and records are curated and conserved in consultation with the Arizona state historic preservation office (and American Indian tribes if applicable). Some archeological sites that can be adequately protected may be interpreted to the visitor.	National Historic Preservation Act; Archeological Resources Protection Act; the *Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation;* Programmatic Agreement among the National Park Service, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers (1995); NPS *Management Policies 2006*, DO 28 "Cultural Resource Management Guideline"
Actions The National Park Service will take the following kinds of actions to meet legal and policy requirements related to archeological sites:	
• Continue to conduct a parkwide cultural resource inventory. • Continue to survey and inventory archeological sites parkwide; determine and document their significance. The most critical area for study is park land where development or visitor activity is planned. • Determine which archeological sites should be added to the Archeological Sites Management Information System (ASMIS) and the National Register of Historic Places. • Educate visitors on regulations governing archeological resources and their removal and transport. • Monitor archeological sites. • Treat all archeological resources as eligible for listing on the National Register of Historic Places pending a formal determination by the National Park Service, the state historic preservation office, and associated Indian tribes as to their significance. • Protect all archeological resources eligible for listing or listed on the national register; if disturbance to such resources is unavoidable, conduct formal consultation with the Advisory Council on Historic Preservation, as appropriate, and the Arizona state historic preservation office and Indian tribes in accordance with the National Historic Preservation Act and implementing regulations.	

HISTORIC STRUCTURES

Current laws and policies require that the following conditions be achieved for historic structures (e.g., buildings, structures, roads, and trails):

Desired Condition	Source
Historic structures are inventoried and their significance and integrity are evaluated under National Register of Historic Places criteria. The qualities that contribute to the listing or eligibility for listing of historic structures on the national register are protected in accordance with the *Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation* (unless it is determined through a formal process that disturbance or natural deterioration is unavoidable).	National Historic Preservation Act; Archeological and Historic Preservation Act; the *Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation*; *Secretary of the Interior's Standards for the Treatment of Historic Properties*; Programmatic Agreement among the National Park Service, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers (1995); NPS *Management Policies 2006*, DO 28 "Cultural Resource Management Guideline."

Actions

The National Park Service will take the following kinds of actions to meet legal and policy requirements related to historic structures:

- Update and certify the list of classified structures (LCS).
- Determine the appropriate level of preservation for each historic structure formally determined to be eligible for listing or listed on the National Register of Historic Places (subject to the *Secretary of the Interior's Standards*).
- Implement and maintain the appropriate level of preservation for such properties.
- Analyze the design elements (e.g., materials, colors, shape, massing, scale, architectural details, and site details) of historic structures in the park (e.g., intersections, curbing, signs, and roads and trails) to guide the rehabilitation and maintenance of sites and structures.
- Prepare historic preservation plans to guide maintenance.
- Document history through oral histories of individuals, groups, and others who have ties to the park.
- Before modifying any historic structure on the National Register of Historic Places, such as Manning Cabin, the National Park Service will consult with the state historic preservation officer and the Advisory Council for Historic Preservation, as appropriate.
- Before modifying any structures associated with "Mission 66," the structures would be evaluated for listing on the national register in consultation with the state historic preservation officer.
- Complete a survey, inventory, and evaluation of historic properties.
- Submit the inventory and evaluation results to the state historic preservation officer for review and comment. Forward the final nomination to the keeper of the national register with recommendations for eligibility to the national register.
- Implement and maintain the appropriate level of preservation for such structures.

ETHNOGRAPHIC RESOURCES Certain contemporary American Indian and other communities are permitted by law, regulation, or policy to pursue customary religious, subsistence, and other cultural uses of NPS resources with which they are traditionally associated. Recognizing that its resource protection mandate affects this human use and cultural context of park resources, the National Park Service plans and executes programs in ways to safeguard cultural and natural resources while reflecting informed concern for contemporary peoples and cultures traditionally associated with them. Consultation with traditionally associated peoples or groups would occur before any NPS proposals are acted upon. Consultations would identify and address any concerns the peoples or groups might have regarding potential impacts on resources in the NPS unit related to a people's or group's cultural heritage or social identity.	
Desired Condition	**Source**
Appropriate cultural anthropological research is conducted in cooperation with groups associated with the park.	National Historic Preservation Act; Advisory Council for Historic Preservation implementing regulations; NPS *Management Policies 2006*, DO 28 "Cultural Resource Management Guideline"
To the extent practicable, permitted by law, and not clearly inconsistent with essential agency functions, the National Park Service accommodates access to and ceremonial use of Indian sacred sites by Indian religious practitioners and avoids adversely affecting the physical integrity of these sacred sites."	EO 13007 on American Indian Sacred Sites; American Indian Religious Freedom Act
NPS general regulations on access to and use of natural and cultural resources in the national park are applied in an informed and balanced manner that is consistent with national park purposes and does not unreasonably interfere with American Indian use of traditional areas or sacred resources and does not result in the degradation of national park resources.	EO 13007 on American Indian Sacred Sites; NPS *Management Policies 2006*
American Indians and other individuals and groups linked by ties of kinship or culture to ethnically identifiable human remains, sacred objects, objects of cultural patrimony, and associated funerary objects are consulted when such items may be disturbed or are encountered on park lands. Access to sacred sites and park resources by American Indians continues to be provided when the use is consistent with park purposes and the protection of resources. All ethnographic resources determined eligible for listing or listed on the national register are protected. If disturbance of such resources is unavoidable, formal consultation with the state historic preservation officer and the Advisory Council on Historic Preservation, and with American Indian tribes as appropriate, is conducted.	NPS *Management Policies 2006;* Native American Graves Protection and Repatriation Act, American Indian Religious Freedom Act
All executive agencies are required to consult, to the greatest extent practicable and to the extent permitted by law, with tribal governments before taking actions that affect federally recognized tribal governments. These consultations are to be open and candid, and confidential as needed, so that all interested parties may evaluate for themselves the potential impact of relevant proposals.	Presidential memorandum of April 29, 1994, on government-to-government relations with tribal governments; National Historic Preservation Act; Advisory Council for Historic Preservation implementing regulations
In addition to the inadvertent discoveries of cultural resource, NPS *Management Policies 2006* states in part that a park's "traditionally associated peoples should be consulted about . . . other proposed NPS actions that may affect the treatment of, use of, and access to park resources with cultural meaning to a group."	NPS *Management Policies 2006*

ETHNOGRAPHIC RESOURCES (cont.)
Actions
To accomplish the above goals, the National Park Service will do the following:
• Prepare a cultural affiliation study to determine which tribes and other traditionally associated groups should be consulted for actions at the park. • Prepare an ethnographic overview and assessment. • Survey and inventory ethnographic resources and document their significance. • Treat all ethnographic resources as eligible for listing on the National Register of Historic Places pending a formal determination by the National Park Service and the state historic preservation officer as to their significance. • Conduct regular consultations with affiliated tribes and other traditionally associated groups to continue to improve communications and resolve any problems or misunderstandings that occur. • Continue to encourage the employment of American Indians on the park staff to improve communications and working relationships and encourage cultural diversity in the workplace. • Continue to provide access to sacred sites and park resources by American Indians when the use is consistent with park purposes and the protection of resources. • Provide for access to and use of natural and cultural resources in the park and collections by American Indians that are consistent with park purposes; do not reasonably interfere with American Indian use of traditional areas or sacred resources, and do not degrade park resources. • Protect all ethnographic resources determined eligible for listing or listed on the national register; if disturbance to such resources is unavoidable, conduct formal consultation with associated tribes and the state historic preservation officer, and, as appropriate, the Advisory Council on Historic Preservation, in accordance with the National Historic Preservation Act. • Conduct consultation with affiliated Indian tribes and other traditionally associated groups throughout the course of the planning process for this and other documents. • Have tribes and other traditionally associated groups identify resources important to Indian tribes during the scoping process, and carefully incorporate this information into the design of all the alternatives so that these resources are protected under any alternative considered. • Document oral histories with individuals, groups, and tribes linked to the park to establish cultural affiliation and obtain information necessary to better manage park ethnographic resources.

CULTURAL LANDSCAPES

According to the National Park Service's *Cultural Resource Management Guideline* (DO-28), a cultural landscape is

> a reflection of human adaptation and use of natural resources and is often expressed in the way land is organized and divided, patterns of settlement, land use, systems of circulation, and the types of structures that are built. The character of a cultural landscape is defined both by physical materials, such as roads, buildings, walls, and vegetation, and by use reflecting cultural values and traditions.

Current laws and policies require that the following conditions be achieved for cultural landscapes.

Desired Condition	Source
Cultural landscape inventories are conducted to identify landscapes potentially eligible for listing in the national register and to assist in future management decisions for landscapes and associated resources, both cultural and natural. The management of cultural landscapes focuses on preserving the landscape's physical attributes, biotic systems, and uses when those uses contribute to its historical significance. Treatments are based on sound preservation practices for the preservation, rehabilitation, restoration, or reconstruction of cultural landscapes is undertaken in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guideline's for the Treatment of Cultural Landscapes*.	National Historic Preservation Act of 1966, as amended (16 USC 470); Advisory Council on Historic Preservation's implementing regulations regarding the "Protection of Historic Properties" (36 CFR 800); *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes* (1996); NPS *Management Policies 2006*; National Park Service's *Cultural Resources Management Guideline* (DO-28, 1996)

Actions

To accomplish the above goals, the National Park Service will do the following:

- Complete a survey, inventory, and evaluation of landscapes under national register criteria.
- Complete a survey, inventory, and evaluation of cultural landscapes.
- Submit the inventory and evaluation results to the state or tribal historic preservation officer for review and comment; forward final nomination form to the keeper of the national register with recommendations for eligibility to the national register.
- Determine the appropriate level of preservation for each landscape formally determined to be eligible for listing or actually listed on the national register, subject to the *Secretary of the Interior's Standards*.
- Implement and maintain the appropriate level of preservation for such resources.
- Prepare cultural landscape reports for cultural landscapes to determine historical significance, to support preservation needs and guide the rehabilitation and maintenance of cultural landscapes.

MUSEUM COLLECTIONS Current laws and policies require that the following conditions be achieved in the park for museum collections:	
Desired Condition	**Source**
All museum collections (objects, specimens, and manuscript collections) are identified and inventoried, catalogued, documented, preserved, and protected, and provision is made for their access to and use of these items for exhibits, research, and interpretation in consultation with traditionally associated groups. The qualities that contribute to the significance of collections are protected in accordance with established standards.	National Historic Preservation Act; Archeological and Historic Preservation Act; Archeological Resources Protection Act; Native American Graves Protection and Repatriation Act; NPS *Management Policies 2006*, DO 28 "Cultural Resource Management Guideline"; *NPS Museum Handbook;* NPS *Museum Collection Facilities Strategy, Intermountain Region, 2005;* Management of Museum Properties Act of 1955 (the "Museum Act"), 16 USC 18f, Historic Sites Act of 1935, Management of Museum Properties Act of 1955 (commonly known as the Museum Act), 16 USC 18f; Historic Sites Act of 1935, 16 USC 461-467
Actions To accomplish the above goals, the National Park Service will do the following:	
• Inventory and catalog all park museum collections in accordance with standards in the NPS *Museum Handbook*. • In accord with NPS standards, develop or update a collections management plan for the park and implement it in relation to the 2005 plan titled "Museum Collection Facilities Strategy, Intermountain Region," which will guide the protection, conservation, and research use of museum objects.	

Other Requirements

VISITOR USE AND EXPERIENCE AND PARK USE REQUIREMENTS Current laws, regulations, and policies leave considerable room for judgment about the best mix of types and levels of visitor use activities, programs, and facilities. For this reason, most decisions related to visitor experience and use are addressed in the alternatives. However, all visitor use of national park system units must be consistent with the following guidelines.	
Desired Condition	**Source**
Park resources are conserved "unimpaired" for the enjoyment of future generations. Visitors have opportunities for forms of enjoyment that are uniquely suited and appropriate to the superlative natural and cultural resources found in the park. No activities occur that would cause derogation of the values and purposes for which the park has been established.	NPS Organic Act, National Park System General Authorities Act, NPS *Management Policies 2006*; Title 36 *Code of Federal Regulations*
For all zones, districts, or other logical management divisions within a national park system unit, the types and levels of visitor use are consistent with the desired resource and visitor experience conditions prescribed for those areas consistent with the unit's purpose.	National Park System General Authorities Act, NPS *Management Policies 2006*
Park visitors will have opportunities to understand and appreciate the significance of the park and its resources, and to develop a personal stewardship ethic by directly relating to the resources.	NPS *Management Policies 2006*
To the extent feasible, programs, services, and facilities in the park are accessible to and usable by all people, including those with disabilities within an inviting atmosphere accessible to every segment of American society.	Architectural Barriers Act of 1968; Americans with Disabilities Act of 1990; 28CFR36, Architectural Barriers Act Accessibility Guidelines (May 2006); U.S. Access Board Draft Accessibility Guidelines for Outdoor Developed Areas of 1999; NPS *Management Policies 2006;* DO-42, *Accessibility for Visitors with Disabilities in NPS Programs, Facilities, and Services;* Rehabilitation Act of 1973; Secretary of the Interior's regulation 43CFR17, *Enforcement on the Basis of Disability in Interior Programs*;
Actions The National Park Service will take the following kinds of actions to meet legal and policy requirements related to visitor understanding and use of the park:	
• Park staff will continue to monitor visitor comments on issues such as crowding, availability of campsites at busy times of the year, availability of parking, user conflicts, and facility conditions. • Conduct periodic visitor surveys to stay informed of changing visitor demographics and desires to better tailor programs to visitor needs and desires. • Pets must be crated, caged, restrained on a leash six feet long or less, or otherwise physically confined at all times. Pets are not allowed on park trails. 36 CFR 2.15 • Bicycles are prohibited in the national park except on established public roads and parking areas and on routes designated for their use by posting signs or by marking on a map available at the superintendent's office. 36 CFR 4.30 • The use of off-road vehicles is prohibited except on public roads and parking areas. 36 CFR 4.10	

COMMERCIAL SERVICES

Commercial services are another way of providing for the visitor use and experience and park use requirements already described. Commercial operators are "partners" with the National Park Service to provide goods and services to visitors that are necessary and appropriate but not provided by NPS personnel. The Park Service manages commercial service levels and types to achieve the same resource protection and visitor experience conditions required by the NPS Organic Act, General Authorities Act, management policies, and other regulations and policies. In addition, commercial services must comply with the provisions of the NPS Concessions Management Improvement Act of 1998. By law, all commercial activities in national park system units must be authorized in writing by the superintendent. A commercial activity is defined as any activity for which compensation is exchanged. It includes activities by for-profit and nonprofit operators. Commercial services are more than just concessions. They include concession contracts, commercial use authorizations, leases, cooperative agreements, rights of way, and special use permits. All commercial services must be managed. All commercial services must be necessary and/or appropriate by achieving the resource protection and visitor use goals for the park unit.

Desired Condition	Source
Same as Visitor Use and Experience and Park Use Requirements (above)	Same as Visitor Use and Experience and Park Use Requirements
All commercial services must be authorized, must be necessary and/or appropriate, and must be economically feasible. Appropriate planning must be done to support commercial services authorization.	NPS Concessions Management Improvement Act of 1998, NPS *Management Policies 2006*

Actions

The National Park Service will take the following kinds of actions to meet legal and policy requirements related to commercial services:

- Establish and document that all commercial services in the park unit are necessary and/or appropriate before they are proposed or reauthorized.
- Ensure that all necessary and/or appropriate commercial activities in the park unit are authorized in writing by the superintendent.
- Stop all unauthorized commercial activities in the park unit.
- Use the most appropriate authorization tool (concession contracts, commercial use authorizations, leases, cooperative agreements, rights of way, and special use permits) to manage the commercial services program effectively and efficiently.
- Ensure that all commercial activities in the park unit provide high-quality visitor experiences while protecting important natural, cultural, and scenic resources.
- Ensure that new or modified concessions are economically feasible and that the operator has a reasonable opportunity to make a profit before they are proposed in a planning document.
- Establish levels of commercial use that are consistent with resource protection and visitor experience goals for the park unit and do not unduly interfere with the independent visitor's ability to participate in the same activity.
- Ensure that all commercial services are safe and sustainable.
- Authorize only those commercial services that are not or cannot be made available within a reasonable distance outside the park unit.
- Prepare a commercial services plan if necessary to describe in detail the actions required to achieve commercial services and related visitor experience goals.

PUBLIC HEALTH AND SAFETY

NPS *Management Policies 2006* state that the saving of human life will take precedence over all other management actions as the Park Service strives to protect human life and provide for injury-free visits. Current laws and policies require that the following conditions be achieved in the park:

Desired Condition	Source
While recognizing that there are limitations on its capability and constraints imposed by the Organic Act to not impair resources, the service and its concessioners, contractors and cooperators will seek to provide a safe and healthful environment for visitors and employees. The park staff will strive to identify recognizable threats to safety and health and protect property by applying nationally accepted standards. Consistent with mandates and nonimpairment, the park staff will reduce or remove known hazards and/or apply appropriate mitigating measures, such as closures, guarding, gating, education, and other actions.	NPS *Management Policies 2006,* DO-50 and RM-50 "Safety and Health"; DO-58 and RM-58 "Structural Fire Management"; DO-83 and RM-83 "Public Health"; DO-51 and RM-51 "Emergency Medical Services"; DO-30 and RM-30 "Hazard and Solid Waste Management; OSHA 29CFR.

Actions

The National Park Service will take the following kinds of actions to meet legal and policy requirements related to public health and safety:

- Establish a documented Safety Program in the park to address health and safety concerns and identify appropriate levels of action and activities.
- Ensure that all potable water systems and waste water systems in the park meet state and federal requirements.
- Provide for interpretive signs and materials to notify visitors of potential safety concerns, hazards and procedures to help provide for a safe visit to the park and to ensure that visitors are aware of possible risks of certain activities.
- Establish a Structural Fire Program and Maintain a Structural Fire Brigade to provide prevention programs and protection of life and property.
- Develop an emergency preparedness program to maximize visitor and employee safety and protection of resources and property.
- Develop an emergency operations plan including a hazardous spill response plan to plan for and respond to spills.
- Provide a search and rescue program to make reasonable efforts to search for lost persons and rescue sick, injured or stranded persons.
- Provide an emergency medical services program to provide for the care of the ill and injured, including emergency pre-hospital care and the emergency medical transport of sick and injured by hospital from the park's remote setting to medical help.

SUSTAINABLE DESIGN/DEVELOPMENT

Sustainability can be described as the result achieved by managing units of the national park system in ways that do not compromise the environment or its capacity to provide for present and future generations. Sustainable practices minimize the short- and long-term environmental impacts of developments and other activities through resource conservation, recycling, waste minimization, and the use of energy-efficient and ecologically responsible materials and techniques.

Desired Condition	Source
NPS and concessioner visitor management facilities are harmonious with park resources, compatible with natural processes, aesthetically pleasing, functional, as accessible as possible to all segments of the population, energy-efficient, and cost-effective.	NPS *Management Policies 2006*; EO 13123, "Greening the Government through Efficient Energy Management"; EO 13101, "Greening the Government through Waste Prevention, Recycling, and Federal Acquisition"; NPS *Guiding Principles of Sustainable Design;* DO 13, "Environmental Leadership"; DO 90, "Value Analysis."
All decisions regarding park operations, facilities management, and development in the park — from the initial concept through design and construction — reflect principles of resource conservation. Thus, all park developments and park operations are sustainable to the maximum degree possible and practical. New developments and existing facilities are located, built, and modified according to the *Guiding Principles of Sustainable Design* (NPS 1993) or other similar guidelines.	"Greening Federal Facilities: An Energy, Environmental, and Economic Resource Guide for Federal Facility Managers and Designers," 2nd ed.
Management decision-making and activities throughout the national park system should use value analysis, which is mandatory for all Department of the Interior bureaus, to help achieve this goal. Value planning, which may be used interchangeably with value analysis/value engineering/value management, is most often used when value methods are applied on general management or similar planning activities.	Director's Order #90 "Value Analysis"

Actions

The NPS *Guiding Principles of Sustainable Design* (1993b) directs NPS management philosophy. It provides a basis for achieving sustainability in facility planning and design, emphasizes the importance of biodiversity, and encourages responsible decisions. The guidebook articulates principles to be used in the design and management of tourist facilities that emphasize environmental sensitivity in construction, the use of nontoxic materials, resource conservation, recycling, and integrating visitors with natural and cultural settings. Sustainability principles have been developed and are followed for interpretation, natural resources, cultural resources, site design, building design, energy management, water supply, waste prevention, and facility maintenance and operations. The Park Service also reduces energy costs, eliminates waste, and conserves energy resources by using energy-efficient and cost-effective technology. Energy efficiency is incorporated into the decision-making process during the design and acquisition of buildings, facilities, and transportation systems emphasizing the use of renewable energy sources.

In addition to following these principles, the following also will be accomplished:

- Have NPS staff work with appropriate experts to make park facilities and programs sustainable. Perform value analysis and value engineering, including life cycle cost analysis, to examine the energy, environmental, and economic implications of proposed developments.
- Support and encourage suppliers, permittees, and contractors to follow sustainable practices.
- Address sustainable practices within and outside the national park in interpretive programs.
- Promote the reduction, reuse, and recycling of materials; support the rehabilitation (recycling) of existing buildings and facilities over new construction; require new developments or modifications of existing facilities to be built using NPS sustainability guidelines.
- The park has state-of-the-art water systems for conserving water, and energy conservation technologies and renewable energy sources whenever possible. Biodegradable, nontoxic, and durable materials are used in the park whenever possible. Park personnel promote the reduction, use, and recycling of materials and avoid as much as possible materials that are nondurable or environmentally detrimental or that require transportation from great distances.
- Promote and encourage modes of transportation other than the single-occupancy vehicle.
- Promote land use planning for transportation that can efficiently meet human needs and can be responsibly planned to conserve the finite resources.

TRANSPORTATION TO AND WITHIN THE PARK Current laws and policies require that the following conditions be achieved in the park:	
Desired Condition	**Source**
Visitors have reasonable access to the park, and there are connections from the park to regional transportation systems as appropriate. Transportation facilities in the park provide access for the protection, use, and enjoyment of park resources. They preserve the integrity of the surroundings, respect ecological processes, protect park resources, and provide the highest visual quality and a rewarding visitor experience.	"NPS Transportation Planning Guidebook," p.1.
The National Park Service participates in all transportation planning forums that may result in links to parks or impact park resources. Working with federal, tribal, state, and local agencies on transportation issues, the National Park Service seeks reasonable access to parks, and connections to external and alternative transportation systems.	NPS *Management Policies 2006*
Actions The National Park Service will take the following kinds of actions to meet legal and policy requirements related to transportation to and in the park:	
• Work with gateway communities and local, regional, state, tribal, and federal agencies to develop a regional approach to transportation planning in Pima County. Encourage a multiagency, multicounty regional transportation planning group. • Work with the U.S. Department of Transportation, the Federal Highway Administration, the Arizona Department of Transportation, and other sources to seek funding and staff to participate in and encourage effective regional transportation planning and enhancements, including both road and nonroad transportation (e.g., bikeways, road signs, trails, intelligent transportation systems, historic preservation, recreational access and facility development, visitor centers, traffic calming devices, gateway community enhancements). • Encourage, where appropriate, alternative transportation systems that contribute to maximum visitor enjoyment of and minimum adverse impacts on park resources and values. • Advocate for corridor crossings for terrestrial and aquatic wildlife, and other accommodations to promote biodiversity. • Avoid or mitigate (1) harm to individual animals, (2) the fragmentation of plant and animal habitats, and (3) the disruption of natural systems.	

UTILITIES AND COMMUNICATION FACILITIES Current laws and policies require that the following conditions be achieved in the national park:	
Desired Condition	**Source**
Park resources or public enjoyment of the park are not denigrated by nonconforming uses. Telecommunication structures are permitted in the park to the extent that they do not jeopardize the park's mission and resources. No new nonconforming use or rights-of-way are permitted through the park without specific statutory authority and approval by the director of the National Park Service or his representative, and are permitted only if there is no practicable alternative to such use of NPS lands.	Telecommunications Act; 16 USC 79; 23 USC 317; 36 CFR 14; NPS *Management Policies 2006;* DO 53A, "Wireless Telecommunications"; Reference Manual 53, "Special Park Uses."
Actions	
The Telecommunications Act of 1996 directs all federal agencies to assist in the national goal of achieving a seamless telecommunications system throughout the United States by accommodating requests by telecommunication companies for the use of property, rights-of-way, and easements to the extent allowable under each agency's mission. The National Park Service is legally obligated to permit telecommunication infrastructure in the parks if such facilities can be structured to avoid interference with park purposes. • Locate new or reconstructed utilities and communications infrastructures in association with existing structures and along roadways or other established corridors in developed areas. For reconstruction or extension into undisturbed areas, select routes that will minimize impacts on the park's natural, cultural, and visual resources. • Place utility lines underground to the maximum extent possible. • Work with service companies, local communities, and the public to locate new utility lines so that there is minimal effect of park resources. • Follow NPS policies in processing applications for commercial telecommunications applications.	

APPENDIX C: LEGAL AND ADMINISTRATIVE CONSTRAINTS ON PLANNING

Saguaro National Park – General Management Planning

LAWS

American Indian Religious Freedom Act (AIRFA)
5 USC 551 et seq. 2

Americans with Disabilities Act of 1990 (ADA)
42 USC 12101—12213

Archaeological Resources Protection Act of 1979
16 USC 470aa—470mm

Clean Air Act
42 USC 7401—7671q

Endangered Species Act of 1973
16 USC 1531—1544

Federal Water Pollution Control Act (commonly known as the Clean Water Act)
33 USC 1251—1387

Freedom of Information Act (FOIA)
5 USC 552

Government Performance and Results Act of 1983 (GPRA)
31 CFR 1115 et seq. 4

Historic Sites, Buildings and Antiquities Act
16 USC 461—467

Lacey Act (Amended)
16 USC 3371—3378

Land and Water Conservation Fund Act of 1965
16 USC 4601-4—4601-11

Migratory Bird Treaty Act of 1918
16 USC 703—712

National Environmental Policy Act of 1969 (NEPA)
42 USC 4321—4370d

National Historic Preservation Act (NHPA)
16 USC 470—470x-6

National Parks Air Tour Management Act of 2000
114 Stat. 61

National Park Service Concessions Management Improvement Act of 1998
16 USC 5951—5966

National Park Service Organic Act
16 USC 1—4

National Park System General Authorities Act
16 USC 1a-1

National Park System Resource Protection Act
16 USC 19jj

National Trails System Act
16 USC 1241—1251

Native American Graves Protection and Repatriation Act (NAGPRA)
25 USC 3001—3013

Occupational Safety and Health Act of 1970
29 USC 651—678

Solid Waste Disposal Act
42 USC 6901—6992k

Volunteers in the Parks Act of 1969
16 USC 18g—18j

Wilderness Act
16 USC 1131—1136

EXECUTIVE ORDERS AND MEMORANDA

Executive Order No. 11644 (Use of Off-road Vehicles on Public Lands) Feb. 8, 1972, 37 FR 2877, as amended by **Ex. Ord. No. 11989**, May 24, 1977, 42 FR 26959; **Ex. Ord. No. 12608**, Sept. 9, 1987, 52 FR 34617 [42 USC 4321]

Executive Order No. 11988 (Floodplain Management) May 24, 1977, 42 FR 26951, as amended by **Ex. Ord. No. 12148**, July 20, 1979, 44 FR 43239 [42 USC 4321]

Executive Order No. 11990 (Protection of Wetlands) May 24, 1977, 42 FR 26961, as amended by **Ex. Ord. No. 12608**, Sept. 9, 1987, 52 FR 34617 [42 USC 4321]

Memorandum on Government-to-Government Relations with Native American Tribal Governments April 29, 1994, 59 FR 22951 [25 USC 450]

Executive Order No. 13006 (Locating Federal Facilities on Historic Properties in Our Nation's Central Cities) May 21, 1996, 61 FR 26071 [40 USC 601a]

Executive Order No. 13007 (Indian Sacred Sites) May 24, 1996, 61 FR 26771 [42 USC1996]

Executive Order No. 13031 (Federal Alternative Fueled Vehicle Leadership) Dec. 13, 1996, 61 FR 66529 [42 USC 13212]

Executive Order No. 13058 (Protecting Federal Employees and the Public from Exposure to Tobacco Smoke in the Federal Workplace) August 9, 1997, 62 FR 43451 [5 USC 7301]

Executive Order No. 13101 (Greening the Government through Waste Prevention, Recycling, and Federal Acquisition) Sept. 14, 1998, 63 FR 49643 [42 USC 6961]

Executive Order No. 13112 (Invasive Species) Feb. 3, 1999, 64 FR 6183

Executive Order No. 13123 (Greening the Government through Efficient Energy Management) June 3, 1999, 64 FR 30851

Executive Order No. 13148 (Greening the Government through Leadership in Environmental Management) April 21, 2000, 65 FR 24595

Executive Order No. 13149 (Greening the Government through Federal Fleet and Transportation Efficiency) April 21, 2000, 65 FR 24607

Executive Order No. 13175 (Consultation and Coordination with Indian Tribal Governments) November 6, 2000, 65 FR 67249 [25 USC 450]

APPENDIX D: OTHER PLANS CONSULTED FOR THE GENERAL MANAGEMENT PLAN, SAGUARO NATIONAL PARK

Note: The following references are for information only and are not part of the bibliographic references found in the text of this document. Those text references refer to documents listed in the "Selected References" section.

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APPENDIX E: TRAIL SYSTEM CRITERIA AND TYPES

TRAIL SYSTEM CRITERIA

The future designated trail system and access points would be developed based on four criteria — cultural resources, natural resources, visitor experience, and park operations. These criteria were derived using recommendations from the public, park staff, current park trail plans, and national trail models. Trails will be sustainable and developed with good engineering practices. Natural and cultural resources vary in both their value and their sensitivity. That is, some resources in the park, such as saguaros or particularly large archeological sites, are considered more valuable than others. Some resources, such as an endangered species or a cultural site on an eroding slope, are more sensitive than others. The park's future trail plan should provide for visitor access and education while protecting the most valued and sensitive resources.

A) Cultural Resources Criteria — Trails will be located to protect important cultural areas that are unique to the park and sensitive to trail impacts, and to avoid archeological sites, Native American sacred sites, and sensitive historic sites.

B) Natural Resource Criteria — Trails will be designed and located to protect important vegetation and wildlife communities that are unique to the park, help restore heavily impacted and environmentally sensitive areas, and direct trail use to areas with suitable soils.

C) Visitor Experience Criteria — Trails will be designed to provide access to a wide range of trail users and to various locations in the park and to avoid or minimize conflicts between trail user types. Trails will be designed to enhance visitor safety. The trail system should provide opportunities for access to a variety of educational and visitor experiences without excessive duplication.

D) Park Operations Criteria — Trails will be designed to maximize the efficiency of maintenance, interpretation, resource management, and visitor protection staffs while minimizing financial costs to the park.

TRAIL TYPES

Type A — Wheelchair accessible trails in the frontcountry constructed and maintained according to Americans with Disability Act standards. The trails typically access primary park features. Trail surfaces would be hardened. The use of directional and interpretive signs and structural elements to enhance safety and mitigate erosion is likely.

Type B — Single or multiuse trails constructed and maintained for moderate to heavy use by visitors with beginner to intermediate skills. Trails are maintained to minimize safety hazards and resource impacts. Trails would be constructed of natural materials and have moderate variations and occasional rock or root protrusions. Trail surfaces would be unpaved. Trails would feature directional signs and structures that would minimize safety hazards and mitigate erosion.

Type C — Single or multiuse trails constructed and maintained for light to moderate use by visitors with intermediate to high skill levels. Trails are maintained primarily to minimize resource impacts. Trails would be constructed of natural materials and have moderate to difficult variations and frequent rock or root protrusions. Trail surfaces would be unpaved. Trails might feature directional signs and structures that would minimize safety hazards and mitigate erosion.

APPENDIX F: WILDERNESS SUITABILITY ASSESSMENT

The purpose of wilderness designation, which may be accomplished only through congressional action, is to preserve and protect wilderness characteristics and values over the long term, while providing opportunities for solitude and unconfined recreation. With passage of the Wilderness Act of 1964 (16 U.S.C. 1131 *et seq*.), Congress declared that it is national policy to secure for present and future generations the benefits of enduring wilderness resources.

Although Congress can act on the suitability findings in the General Management Plan for Saguaro National Park and any other information it chooses, the usual procedure would be for the National Park Service to conduct a formal wilderness study, including an environmental impact statement and formal hearings before the Executive Branch makes an actual recommendation on wilderness.

The Wilderness Act defines wilderness as "…an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation which is protected and managed so as to preserve its natural conditions…." 16 U.S.C 1131(c).

The Wilderness Act, regulations at 43 CFR 19, Management Policies of the NPS (2001), and Director's Order #41 require that the National Park Service (NPS) review all areas within a park to determine if any meet the criteria laid out in the Wilderness Act and NPS Policies.

This determination applied the following Management Policies criteria:

> National Park Service lands will be considered suitable for wilderness if they are at least 5000 acres or of sufficient size to make practicable their preservation and use in an unimpaired condition, and if they possess the following characteristics (as identified in the Wilderness Act):
>
> - The earth and its community of life are untrammeled by humans, where humans are visitors and do not remain;
> - The area is undeveloped and retains its primeval character and influence, without permanent improvements or human habitation;
> - The area generally appears to have been affected primarily by the forces of nature, with the imprint of humans' work substantially unnoticeable;
> - The area is protected and managed so as to preserve its natural conditions; and
> - The area offers outstanding opportunities for solitude or a primitive and unconfined type of recreation.
>
> NPS Management Policies (2001) 6.2.1.1
> *Primary Suitability Criteria*

An interdisciplinary team composed of park and Denver Service Center staff determined that the areas within the expansion lands identified on the attached maps meet the criteria; and therefore, are suitable for wilderness. Significant portions of these expansion lands generally appear to have been affected primarily by the forces of nature with minimal evidence of human activity. These areas of Saguaro National Park offer outstanding opportunities for solitude or for primitive and unconfined recreation.

The suitable areas are located in both districts. Tucson Mountain District has two units (A and B) located north of the existing designated wilderness and one unit (C) east of the existing wilderness. Rincon Mountain has one unit (D) located south of the existing wilderness.

Unit A is composed of approximately 618 suitable acres. This area is undeveloped with few signs of people. Unit A supports a diversity of Sonoran Desert environments including steep cliffs and washes. It includes suitable habitat for the California leaf nosed bat and desert tortoise and is part of the proposed critical habitat for Cactus Ferruginous Pygmy Owls.

Unit B is composed of approximately 615 suitable acres. This area is undeveloped and appears to be affected primarily by forces of nature. This area has excellent opportunities for solitude. Unit B contains primarily Sonoran Desert scrub vegetation. It includes suitable habitat for the California leaf nosed bat and desert tortoise and is part of the proposed critical habitat for Cactus Ferruginous Pygmy Owls.

Unit C is composed of approximately 1292 suitable acres. This area is also undeveloped and appears to be affected primarily by forces of nature. Few people use this unit as only one primitive trail is located within the unit. This area contains some of Tucson's Mountain District's highest peaks, semi-desert grasslands, and Sonoran Desert scrub vegetation. It includes suitable habitat for the California leaf nosed bat and desert tortoise and is part of the proposed critical habitat for Cactus Ferruginous Pygmy Owls.

Unit D is composed of approximately 2191 suitable acres. Much of Unit D is undeveloped and appears to be affected primarily by forces of nature. Few people use this area, which is difficult to access without extensive hiking. Unit D contains sensitive and vital riparian areas including a year round stream and pools. It provides excellent habitat for the lowland leopard frog, lesser long nosed bat, Mexican long-tongued bat, desert tortoise, cactus ferruginous pygmy owl, and many other sensitive riparian species.

All federally-owned expansion lands not mentioned above were found not suitable. Non-federal lands were not evaluated. If state, county, or private lands within the park boundaries are ever purchased or donated to the federal government, they will need to be evaluated for eligibility as wilderness.

All lands determined suitable for wilderness designation will be managed under the provisions of the Wilderness Act and National Park Service policies to maintain wilderness characteristics and values. Interim wilderness management will continue until designation by Congress.

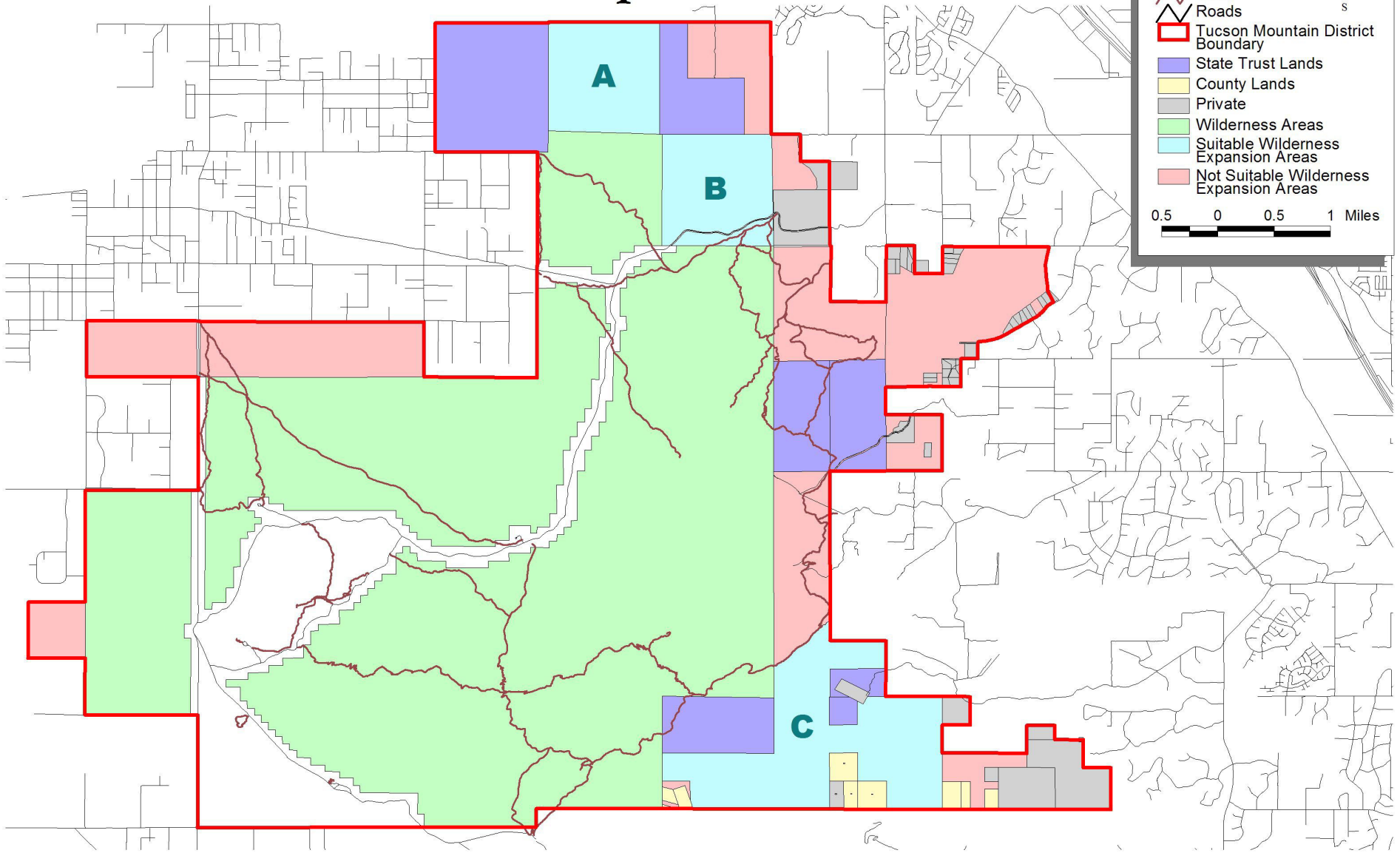
Approximately 4,716 acres of Saguaro National Park's expansion lands have been found to possess wilderness characteristics and values and will be managed as such. These areas of the park have been found suitable to add to the park's existing designated wilderness.

March 2006

Saguaro National Park
Arizona

National Park Service
U.S. Department of the Interior

Tucson Mountain District Wilderness and Suitable Wilderness Expansion Areas



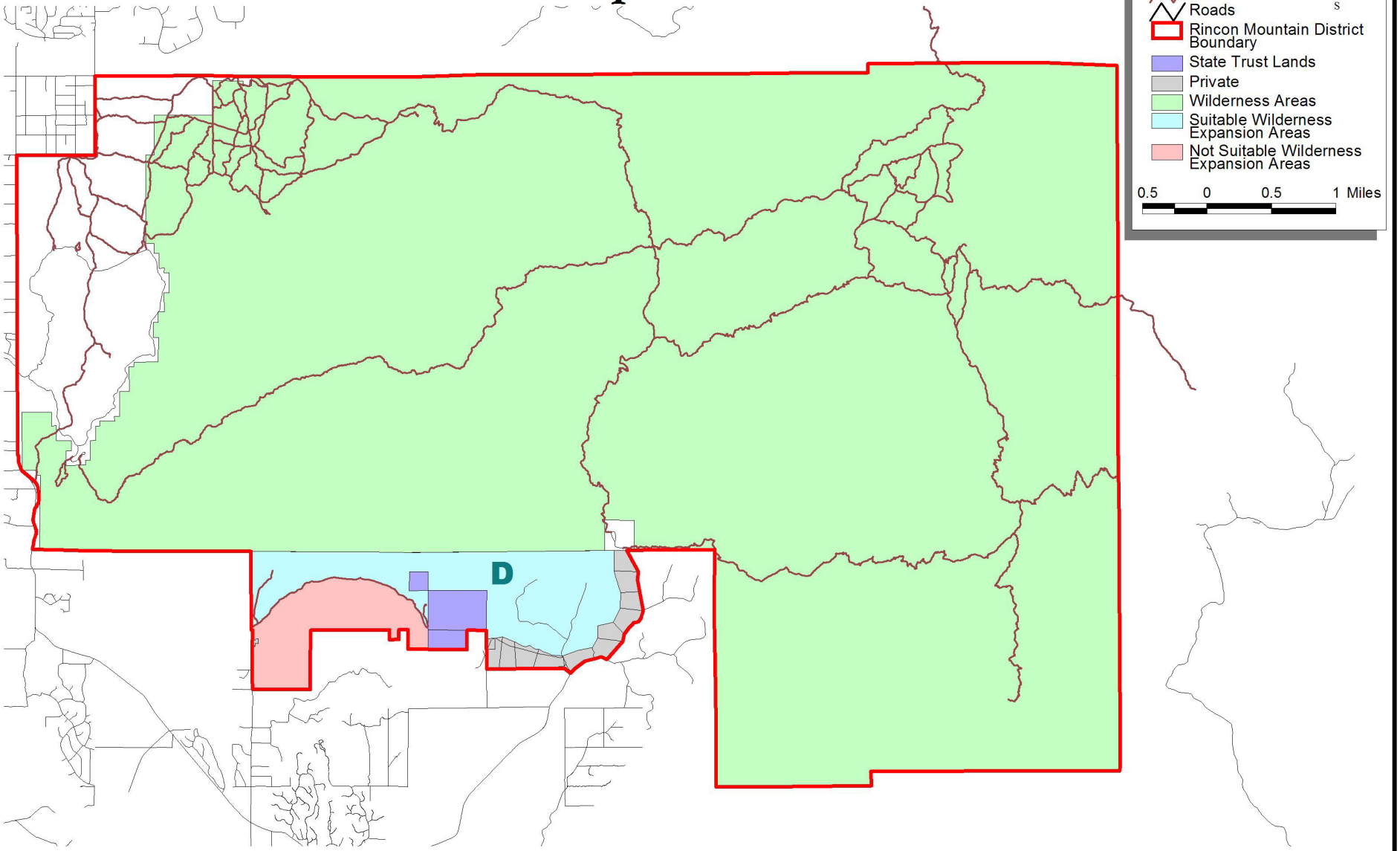
Produced by Matthew Daniels, GIS Specialist Data Sources: Saguaro National Park, Pima County Department of Transportation April 2005

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Saguaro National Park
Arizona

National Park Service
U.S. Department of the Interior

Rincon Mountain District Wilderness and Suitable Wilderness Expansion Areas



Produced by Matthew Daniels, GIS Specialist Data Sources: Saguaro National Park, Pima County Department of Transportation April 2005

gmpalts2.apr

United States Department of the Interior
U.S. Fish and Wildlife Service
Arizona Ecological Services Field Office
2321 West Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951
Telephone: (602) 242-0210 Fax: (602) 242-2513

In Reply Refer to:
AESO/SE
22410-2006-I-0301

March 9, 2006

Memorandum

To: Natural Resource Specialist, National Park Service, Denver, Colorado (Attn: Elizabeth Meyer)

From: Field Supervisor

Subject: Saguaro National Park's General Management Plan

Thank you for your recent request for information on threatened or endangered species, or those that are proposed to be listed as such under the Endangered Species Act of 1973, as amended (Act), which may occur in your project area. The Arizona Ecological Service Field Office has posted lists of the endangered, threatened, proposed, and candidate species occurring in each of Arizona's 15 counties on the Internet. Please refer to the following web page for species information in the county where your project occurs: **http://arizonaes.fws.gov**

If you do not have access to the Internet or have difficulty obtaining a list, please contact our office and we will mail or fax you a list as soon as possible.

After opening the web page, find Arizona County/Species List on the main page. Then click on the county of interest. The arrows on the left will guide you through information on species that are listed, proposed, candidates, or have conservation agreements. Here you will find information on the species' status, a physical description, all counties where the species occurs, habitat, elevation, and some general comments. Additional information can be obtained by going back to the main page. On the left side of the screen, click on Document Library, then click on Documents by Species, then click on the name of the species of interest to obtain General Species Information, or other documents that may be available. Click on the "Cactus" icon to view the desired document.

Please note that your project area may not necessarily include all or any of these species. The information provided includes general descriptions, habitat requirements, and other information for each species on the list. Under the General Species Information, citations for the Federal Register (FR) are included for each listed and proposed species. The FR is available at most Federal depository libraries. This information should assist you in determining which species

may or may not occur within your project area. Site-specific surveys could also be helpful and may be needed to verify the presence or absence of a species or its habitat as required for the evaluation of proposed project-related impacts.

Endangered and threatened species are protected by Federal law and must be considered prior to project development. If the action agency determines that listed species or critical habitat may be adversely affected by a federally funded, permitted, or authorized activity, the action agency will need to request formal consultation with us. If the action agency determines that the planned action may jeopardize a proposed species or destroy or adversely modify proposed critical habitat, the action agency will need to enter into a section 7 conference. The county list may also contain candidate species. Candidate species are those for which there is sufficient information to support a proposal for listing. Although candidate species have no legal protection under the Act, we recommend that they be considered in the planning process in the event that they become listed or proposed for listing prior to project completion.

If any proposed action occurs in or near areas with trees and shrubs growing along watercourses, known as riparian habitat, we recommend the protection of these areas. Riparian areas are critical to biological community diversity and provide linear corridors important to migratory species. In addition, if the project will result in the deposition of dredged or fill materials into waterways, we recommend you contact the Army Corps of Engineers which regulates these activities under Section 404 of the Clean Water Act.

The State of Arizona and some of the Native American Tribes protect some plant and animal species not protected by Federal law. We recommend you contact the Arizona Game and Fish Department and the Arizona Department of Agriculture for State-listed or sensitive species, or contact the appropriate Native American Tribe to determine if sensitive species are protected by Tribal governments in your project area. We further recommend that you invite the Arizona Game and Fish Department and any Native American Tribes in or near your project area to participate in your informal or formal Section 7 Consultation process. We further recommend that you invite the Arizona Game and Fish Department and any Native American Tribes in or near your project area to participate in your informal or formal Section 7 Consultation process.

Specific guidance information regarding the cactus ferruginous pygmy-owl on private land can also be found on our web page under Document Library. From there, click on Documents by Species, then click on cactus ferruginous pygmy-owl, then click on the document titled "Recommended Guidance for Private Landowners Concerning the Cactus Ferruginous Pygmy-owl."

For additional communications regarding this project, please refer to consultation number 22410-2006-I-0301. We appreciate your efforts to identify and avoid impacts to listed and sensitive species in your project area.

If we may be of further assistance, please feel free to contact Brenda Smith (928) 226-0614 (x101) for projects in Northern Arizona, Debra Bills (602) 242-0210 (x239) for projects in central Arizona and along the Lower Colorado River, and Sherry Barrett (520) 670-6150 (x223) for projects in southern Arizona.

for Steven L. Spangle

cc: Regional Supervisor, Arizona Game and Fish Department, Tucson, AZ
Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ

:cgg

Pima County

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Bald eagle	*Haliaeetus leucocephalus*	Threatened	Large, adults have white head and tail. Height 28-38 inches; wingspan 66-96 inches. Dark with varying degrees of mottled brown plumage. Feet bare of feathers.	Apache, Cochise, Coconino, Gila, Graham, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, Yuma	Varies	Large trees or cliffs near water (reservoirs, rivers, and streams) with abundant prey.	Some birds are nesting residents while a larger number winters along rivers and reservoirs. An estimated 200 to 300 birds winter in Arizona. Once endangered (32 FR 4001, 03-11-1967; 43 FR 6233, 02-14-78) because of reproductive failures from pesticide poisoning and loss of habitat, this species was down listed to threatened on August 11, 1995. Illegal shooting, disturbance, and loss of habitat continues to be a problem. Species has been proposed for delisting (64 FR 36454) but still receives full protection under the ESA.
California Brown pelican	*Pelecanus occidentalis californicus*	Endangered	Large dark gray-brown water bird with a pouch underneath long bill and webbed feet. Adults have a white head and neck, brownish black breast, and silver gray upper parts.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, Yuma	Varies	Coastal land and islands; species found around many Arizona lakes and rivers.	Subspecies is found on Pacific Coast and is endangered due to pesticides. It is an uncommon transient in Arizona on many Arizona lakes and rivers. Individuals wander up from Mexico in summer and fall. No breeding records in Arizona.
Chiricahua leopard frog	*Rana chiricahuensis*	Threatened	Cream colored tubercules (spots) on a dark background on the rear of the thigh, dorsolateral folds that are interrupted and deflected medially, and a call given out of water distinguish this spotted frog from other leopard frogs.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, Navajo, Pima, Santa Cruz, Yavapai	3300-8900 ft	Streams, rivers, backwaters, ponds, and stock tanks that are mostly free from introduced fish, crayfish, and bullfrogs.	Require permanent or nearly permanent water sources. Populations north of the Gila River may be a closely-related, but distinct, undescribed species. A special rule allows take of frogs due to operation and maintenance of livestock tanks on State and private lands.
Desert pupfish	*Cyprinodon macularius*	Endangered	Small (2 inches) smoothly rounded body shape with narrow vertical bars on the sides. Breeding males blue on head and sides with yellow on tail. Females and juveniles tan to olive colored back and silvery sides.	Graham, La Paz, Maricopa, Pima, Pinal, Santa Cruz, Yavapai	< 5,000 ft	Shallow springs, small streams, and marshes. Tolerates saline and warm water.	Critical habitat includes Quitobaquito Springs, Pima County, portions of San Felipe Creek, Carrizo Wash, and Fish Creek Wash, Imperial County, California. Two subspeices are recognized: Desert Pupfish (C.m.macularis) and Quitobaquito Pupfish (C.m.eremus).

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Gila chub	*Gila intermedia*	Endangered	Deep compressed body, flat head. Dark olive-gray color above, silver sides. Endemic to Gila River Basin.	Cochise, Gila, Graham, Greenlee, Maricopa, Pima, Pinal, Santa Cruz, Yavapai	2,000 - 5,500 ft	Pools, springs, cienegas, and streams.	Found on multiple private lands, including the Nature Conservancy, the Audubon Society, and others. Also occurs on Federal and state lands and in Sonora, Mexico. Critical habitat occurs in Cochise, Gila, Graham, Greenlee, Pima, Pinal, Santa Cruz and Yavapai counties.
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	Endangered	Small (2 inches), guppy-like, live bearing, lacks dark spots on its fins. Breeding males are jet black with yellow fins.	Gila, Graham, La Paz, Maricopa, Pima, Pinal, Santa Cruz, Yavapai	< 4,500 ft	Small streams, springs, and cienegas vegetated shallows.	Species historically occurred in backwaters of large rivers but is currently isolated to small streams and springs.
Huachuca water umbel	*Lilaeopsis schaffneriana ssp. recurva*	Endangered	Herbaceous, semi-aquatic perennial in the parsley family (Umbelliferae) with slender erect, hollow, leaves that grow from the nodes of creeping rhizomes. Flower: 3 to 10 flowered umbels arise from root nodes.	Cochise, Pima, Santa Cruz	3500-6500 ft	Cienegas, perennial low gradient streams, wetlands.	Species also occurs in adjacent Sonora, Mexico, west of the continental divide. Critical habitat in Cochise and Santa Cruz counties (64 FR 37441, July 12, 1999).
Jaguar	*Panthera onca*	Endangered	Largest species of cat native to Southwest. Muscular, with relatively short, massive limbs, and a deep-chested body. Usually cinnamon-buff in color with many black spots. Weights ranges from 40-135 kg (90-300 lbs).	Cochise, Santa Cruz, Pima	1,600 - >9,000 ft	Found in Sonoran desertscrub up through subalpine conifer forest.	Also occurs in New Mexico. A Jaguar conservation team is being formed that is being led by Arizona and New Mexico state entities along with private organizations.
Kearney blue star	*Amsonia kearneyana*	Endangered	A herbaceous perennial about 2 feet tall in the dogbane family (Apocynaceae). Thickened woody root and many pubescent (hairy) stems that rarely branch. Flowers: white terminal inflorescence in April and May.	Pima	3600-3800 ft	West-facing drainages in the Baboquivari Mountains.	Plants grow in stable, partially shaded, coarse alluvium along a dry wash in the Baboquivari Mountains. Range is extremely limited. Protected by Arizona Native Plant Law.

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Lesser long-nosed bat	*Leptonycteris curasoae yerbabuenae*	Endangered	Elongated muzzle, small leaf nose, and long tongue. Yellowish brown or gray above and cinnamon brown below. Tail minute and appears to be lacking. Easily disturbed.	Cochise, Gila, Graham, Greenlee, Pima, Pinal, Maricopa, Santa Cruz	< 6000 ft	Desert scrub habitat with agave and columnar cacti present as food plants.	Day roosts in caves and abandoned tunnels. Forages at night on nectar, pollen, and fruit of paniculate agaves and columnar cacti. This species is migratory and is present in Arizona usually from April to September and south of the border the remainder of the year.
Masked bobwhite	*Colinus virginianus ridgewayi*	Endangered	Males brick-red breast and black head and throat. Females are generally nondescript but resemble other races such as the Texas bobwhite.	Pima	1000-4000 ft	Desert grasslands with diversity of dense native grasses, forbs, and brush.	Species is closely associated with Acacia angustissima. Formerly occurred in Altar and Santa Cruz valleys, as well as Sonora, Mexico. Presently only known from reintroduced populations on Buenos Aires NWR.
Mexican spotted owl	*Strix occidentalis lucida*	Threatened	Medium sized with dark eyes and no ear tufts. Brownish and heavily spotted with white or beige.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai	4100-9000 ft	Nests in canyons and dense forests with multi-layered foliage structure.	Generally nest in older forests of mixed conifer or ponderosa pine/gambel oak type, in canyons, and use variety of habitats for foraging. Sites with cool microclimates appear to be of importance or are preferred. Critical habitat was finalized on August 31, 2004 (69 FR 53182). Critical habitat in Arizona occurs in Apache, Cochise, Coconino, Gila, Graham, Greenlee, Maricopa, Navajo, Pima, Pinal, Santa Cruz, and Yavapai counties.
Nichol Turk's head cactus	*Echinocactus horizonthalonius var. nicholii*	Endangered	Blue-green to yellowish-green, columnar, 18 inches tall, 8 inches in diameter. Spine clusters have 5 radial and 3 central spines; one downward short; 2 spines upward and red or vasally gray. Flower: pink fruit: woolly white.	Pima, Pinal	2400-4100 ft	Sonoran desertscrub.	Found in unshaded microsites in Sonoran desertscrub on dissected alluvial fans at the foot of limestone mountains and on inclined terraces and saddles on limestone mountain sides.
Ocelot	*Leopardus (=Felis) pardalis*	Endangered	Medium-sized spotted cat whose tail is about 1/2 the length of head and body. Yellowish with black streaks and stripes running from front to back. Tail is spotted and face is less heavily streaked than the back and sides.	Cochise, Pima, Santa Cruz	< 8000 ft	Humid tropical and sub-tropical forests, savannahs, and semi-arid thornscrub.	May persist in partly-cleared forests, second-growth woodland, and abandoned cultivated areas reverted to brush. Universal component is presence of dense cover. Unconfirmed reports of individuals in the southern part of the State continue to be received.

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Pima pineapple cactus	*Coryphantha scheeri var. robustispina*	Endangered	Hemispherical stems 4-7 inches tall 3-4 inches diameter. Central spine 1 inch long straw colored hooked surrounded by 6-15 radial spines. Flower: yellow, salmon, or rarely white narrow floral tube..	Pima, Santa Cruz	2300-5000 ft	Sonoran desertscrub or semi-desert grassland communities.	Occurs in alluvial valleys or on hillsides in rocky to sandy or silty soils. This species can be confused with juvenile barrel cactus (Ferocactus). However, the spines of the later are flattened, in contrast with the round cross-section of the Coryphanta spines. 80-90% of individuals on state or private land.
Sonoran pronghorn	*Antilocapra americana sonoriensis*	Endangered	Buff on back and white below, hoofed with slightly curved black horns having a single prong. Smallest and palest of the pronghorn subspecies	Maricopa, Pima, Yuma	500 - 2,000 ft	Broad intermountain alluvial valleys with creosote-bursage and palo verde-mixed cacti associations.	Typically, bajadas are used as fawning areas and sandy dune areas provide food seasonally. Historical range was probably larger than exists today. This subspecies also occurs in Mexico.
Southwestern willow flycatcher	*Empidonax traillii extimus*	Endangered	Small passerine (about 6 inches) grayish-green back and wings, whitish throat, light olive-gray breast and pale yellowish belly. Two wingbars visible. Eye-ring faint or absent.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, Yuma	<8500 ft	Cottonwood/willow and tamarisk vegetation communities along rivers and streams.	Migratory riparian-obligate species that occupies breeding habitat from late April to September. Distribution within its range is restricted to riparian corridors. Difficult to distinguish from other members of the Empidonax complex by sight alone. Training seminar required for those conducting flycatcher surveys. Critical habitat was finalized on October 19, 2005 (50 CFR 60886) and can be viewed at http://arizonaes.fws.gov. In Arizona there are critical habitat segments in Apache, Cochise, Gila, Graham, Greenlee, Maricopa, Mohave, Pima, Pinal, and Yavapai counties.
Acuna cactus	*Echinomastus erectocentrus var. acunensis*	Candidate	<12 inches high; spine clusters borne on tubercles, each with a groove on the upper surface. 2-3 central spines and 12 radial spines. Flowers pink to purple.	Pima, Pinal	1300-2000 ft	Well drained knolls and gravel ridges in Sonoran desertscrub.	Immature plants distinctly different from mature plants. They are disc-shaped or spherical and have no central spines until they are about 1.5 inches. Radial spines are dirty white with maroon tips.
Sonoyta mud turtle	*Kinosternon sonoriense longifemorale*	Candidate	Primarily a pond turtle, prefers mud or sandy bottoms. Body 3 1/2 to 6 1/2 inches. Head and neck mottled with contrasting light and dark markings. Found in Quitobaquito Springs.	Pima	1,100 ft	Ponds and streams.	Species also found in Rio Sonoyta, Sonora, Mexico.

COMMON NAME	SCIENTIFIC NAME	STATUS	DESCRIPTION	COUNTY	ELEVATION	HABITAT	COMMENTS
Yellow-billed cuckoo	*Coccyzus americanus*	Candidate	Medium-sized bird with a slender, long-tailed profile, slightly down-curved bill, which is blue-black with yellow on the lower half of the bill. Plumage is grayish-brown above and white below, with rufous primary flight feathers.	Apache, Cochise, Coconino, Gila, Graham, Greenlee, La Paz, Maricopa, Mohave, Navajo, Pima, Pinal, Santa Cruz, Yavapai, Yuma	< 6,500 ft	Large blocks of riparain woodlands (cottonwood, willow, or tamarisk galleries).	Listing was found warranted, but precluded as a distinct vertebrate population segment in the western U.S. on July 25, 2001. This finding indicates that the Service has sufficient information to list the bird, but other, higher priority listing actions prevent the Service from addressing the listing of the cuckoo at this time.
Gooddings onion	*Allium gooddingii*	Conservation Agreement	Herbaceous perenial plant; broad, flat, rather blunt leaves; flowering stalk 14-17 inches tall, flattened, and narrowly winged toward apex; fruit is broader than long; seeds are short and thick.	Apache, Greenlee, Pima	> 7,500 ft	Forested drainage bottoms and on moist north facing slopes of mixed conifer and spruce fir forests.	Conservation agreement between the Service and the Forest Service signed in February 1998. In New Mexico on the Lincoln and Gila National Forests.
San Xavier talussnail	*Sonorella eremita*	Conservation Agreement	Land snail, less than one inch in diameter (about .75 inches), 4.5 whorls, round shell, white to pinkish tint.	Pima	3,850-3,920 ft	Deep, limestone rockslide with outcrops of limestone and decomposed granite.	Conservation agreement signed by the Service, Arizona Game and Fish Department, El Paso Natural Gas Company, and Arizona Electric Power Cooperative, Inc. in September 1998.

THE STATE OF ARIZONA
GAME AND FISH DEPARTMENT
2221 West Greenway Road, Phoenix, AZ 85023-4399
(602) 942-3000 • azgfd.gov

Governor
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Director
Duane L. Shroufe
Deputy Director
Steve K. Ferrell

February 27, 2006

Ms. Elizabeth Meyer
National Park Service
Denver Service Center
PO Box 25287
Denver, CO 80225-0287

Re: Special Status Species Information for **Saguaro National Park for General Management Plan for the Parks.**

Dear Ms. Meyer:

The Arizona Game and Fish Department (Department) has reviewed your request, dated February 8, 2006, regarding special status species information associated with the above-referenced project area. The Department's Heritage Data Management System (HDMS) has been accessed and current records show that the special status species listed on the attachments have been documented as occurring on the property of Saguaro National Park (no buffer was assessed). In addition Saguaro National Park West has Proposed Critical Habitat for the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) and Saguaro National Park East has Designated Critical Habitat for the Mexican spotted owl (*Strix occidentalis lucida*).

The Department's HDMS data are not intended to include potential distribution of special status species. Arizona is large and diverse with plants, animals, and environmental conditions that are ever changing. Consequently, many areas may contain species that biologists do not know about or species previously noted in a particular area may no longer occur there. Not all of Arizona has been surveyed for special status species, and surveys that have been conducted have varied greatly in scope and intensity.

Making available this information does not substitute for the Department's review of project proposals, and should not decrease our opportunities to review and evaluate new project proposals and sites. The Department is also concerned about other resource values, such as other wildlife, including game species, and wildlife-related recreation. The Department would appreciate the opportunity to provide an evaluation of impacts to wildlife or wildlife habitats associated with project activities occurring in the subject area, when specific details become available.

An Equal Opportunity Reasonable Accommodations Agency

Ms. Elizabeth Meyer
February 27, 2006
2

If you have any questions regarding this letter, please contact me at (602) 789-3618. General status information, county and watershed distribution lists and abstracts for some special status species are also available on our web site at http://www.azgfd.gov/hdms. If you need specific location information for these species in a GIS layer or other database, please don't hesitate to contact me. We would be happy to work with the National Park Service regarding information exchanges.

Sincerely,

Sabra S. Schwartz
Heritage Data Management System, Program Supervisor

SSS:ss

cc: Rebecca Davidson, Project Evaluation Program Supervisor
Joan Scott, Habitat Program Manager, Region V

AGFD# M06-02155556

Special Status Species within Saguaro National Park East

Arizona Game and Fish Department, Heritage Data Management System
February 27, 2006

Scientific Name	Common Name	ESA	USFS	BLM	State
Abutilon parishii	Pima Indian Mallow	SC	S		SR
Accipiter gentilis	Northern Goshawk	SC	S		WSC
Aspidoscelis burti stictogrammus	Giant Spotted Whiptail	SC	S	S	
Buteogallus anthracinus	Common Black-Hawk		S		WSC
Carex chihuahuensis	A Sedge		S		
Choeronycteris mexicana	Mexican Long-tongued Bat	SC		S	WSC
Corynorhinus townsendii pallescens	Pale Townsend's Big-eared Bat	SC			
Echinocereus fasciculatus	Magenta-flower Hedgehog-cactus				SR
Empidonax fulvifrons pygmaeus	Northern Buff-breasted Flycatcher	SC			WSC
Falco peregrinus anatum	American Peregrine Falcon	SC	S		WSC
Glaucidium brasilianum cactorum	Cactus Ferruginous Pygmy-owl	LE			WSC
Gopherus agassizii (Sonoran Population)	Sonoran Desert Tortoise	SC			WSC
Graptopetalum bartramii	Bartram Stonecrop	SC	S	S	SR
Hedeoma dentatum	Mock-pennyroyal		S		
Leptonycteris curasoae yerbabuenae	Lesser Long-nosed Bat	LE	S		WSC
Lysiloma microphylla var. thornberi	Feather Bush				SR
Muhlenbergia xerophila	Weeping Muhly		S		
Myotis velifer	Cave Myotis	SC		S	
Notholaena lemmonii	Lemmon Cloak Fern	SC			
Nyctinomops femorosaccus	Pocketed Free-tailed Bat			S	
Opuntia versicolor	Stag-horn Cholla				SR
Poeciliopsis occidentalis occidentalis	Gila Topminnow	LE			WSC
Psilotum nudum	Whisk Fern				HS
Rana yavapaiensis	Lowland Leopard Frog	SC	S		WSC
Samolus vagans	Chiricahua Mountain Brookweed		S		
Senecio neomexicanus var. toumeyi	Toumey Groundsel		S		
Sigmodon ochrognathus	Yellow-nosed Cotton Rat	SC			
Sisyrinchium cernuum	Nodding Blue-eyed Grass		S		
Stevia lemmonii	Lemmon's Stevia		S		
Strix occidentalis lucida	Mexican Spotted Owl	LT	S		WSC

Designated Critical Habitat for the Mexican spotted owl (*Strix occidentalis lucida*) within project area. AGFD #M06-02155556, Saguaro National Park's General Management Plan.

Please see later pages for definitions.

Special Status Species within Saguaro National Park West

Arizona Game and Fish Department, Heritage Data Management System
February 27, 2006

Scientific Name	Common Name	ESA	USFS	BLM	State
Abutilon parishii	Pima Indian Mallow	SC	S		SR
Boerhavia megaptera	Tucson Mountain Spiderling		S		
Euphorbia gracillima	Mexican Broomspurge		S		
Gopherus agassizii (Sonoran Population)	Sonoran Desert Tortoise	SC			WSC
Hermannia pauciflora	Sparseleaf Hermannia		S		
Macrotus californicus	California Leaf-nosed Bat	SC		S	WSC
Mammillaria thornberi	Thornber Fishhook Cactus				SR
Myotis velifer	Cave Myotis	SC		S	
Opuntia kelvinensis	Kelvin Cholla				SR
Tumamoca macdougalii	Tumamoc Globeberry		S	S	SR

Proposed Critical Habitat for the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*) within project area. AGFD #M06-02155556, Saguaro National Park's General Management Plan.

GUIDELINES FOR HANDLING SONORAN DESERT TORTOISES
ENCOUNTERED ON DEVELOPMENT PROJECTS
Arizona Game and Fish Department
Revised January 17, 1997

The Arizona Game and Fish Department (Department) has developed the following guidelines to reduce potential impacts to desert tortoises, and to promote the continued existence of tortoises throughout the state. These guidelines apply to short-term and/or small-scale projects, depending on the number of affected tortoises and specific type of project.

Desert tortoises of the Sonoran population are those occurring south and east of the Colorado River. Tortoises encountered in the open should be moved out of harm's way to adjacent appropriate habitat. If an occupied burrow is determined to be in jeopardy of destruction, the tortoise should be relocated to the nearest appropriate alternate burrow or other appropriate shelter, as determined by a qualified biologist. Tortoises should be moved less than 48 hours in advance of the habitat disturbance so they do not return to the area in the interim. Tortoises should be moved quickly, kept in an upright position at all times and placed in the shade. Separate disposable gloves should be worn for each tortoise handled to avoid potential transfer of disease between tortoises. Tortoises must not be moved if the ambient air temperature exceeds 105 degrees Fahrenheit unless an alternate burrow is available or the tortoise is in imminent danger.

A tortoise may be moved up to two miles, but no further than necessary from its original location. If a release site, or alternate burrow, is unavailable within this distance, and ambient air temperature exceeds 105 degrees Fahrenheit, the Department should be contacted to place the tortoise into a Department-regulated desert tortoise adoption program. Tortoises salvaged from projects which result in substantial permanent habitat loss (e.g. housing and highway projects), or those requiring removal during long-term (longer than one week) construction projects, will also be placed in desert tortoise adoption programs. *Managers of projects likely to affect desert tortoises should obtain a scientific collecting permit from the Department to facilitate temporary possession of tortoises.* Likewise, if large numbers of tortoises (>5) are expected to be displaced by a project, the project manager should contact the Department for guidance and/or assistance.

Please keep in mind the following points:

- These guidelines do not apply to the Mohave population of desert tortoises (north and west of the Colorado River). Mohave desert tortoises are specifically protected under the Endangered Species Act, as administered by the U.S. Fish and Wildlife Service.

- These guidelines are subject to revision at the discretion of the Department. We recommend that the Department be contacted during the planning stages of any project that may affect desert tortoises.

- Take, possession, or harassment of wild desert tortoises is prohibited by state law. Unless specifically authorized by the Department, or as noted above, project personnel should avoid disturbing any tortoise.

RAC:NLO:rc

STATUS DEFINITIONS

ARIZONA GAME AND FISH DEPARTMENT (AGFD)
HERITAGE DATA MANAGEMENT SYSTEM (HDMS)

FEDERAL US STATUS

ESA **Endangered Species Act** (1973 as amended)
US Department of Interior, Fish and Wildlife Service (http://arizonaes.fws.gov)

Listed

- **LE** Listed Endangered: imminent jeopardy of extinction.
- **LT** Listed Threatened: imminent jeopardy of becoming Endangered.
- **XN** Experimental Nonessential population.

Proposed for Listing

- **PE** Proposed Endangered.
- **PT** Proposed Threatened.

Candidate (Notice of Review: 1999)

- **C** Candidate. Species for which USFWS has sufficient information on biological vulnerability and threats to support proposals to list as Endangered or Threatened under ESA. However, proposed rules have not yet been issued because such actions are precluded at present by other listing activity.
- **SC** Species of Concern. The terms "Species of Concern" or "Species at Risk" should be considered as terms-of-art that describe the entire realm of taxa whose conservation status may be of concern to the US Fish and Wildlife Service, but neither term has official status (currently all former C2 species).

Critical Habitat (check with state or regional USFWS office for location details)

- **Y** Yes: Critical Habitat has been designated.
- **P** Proposed: Critical Habitat has been proposed.

[\N No Status: certain populations of this taxon do not have designated status (check with state or regional USFWS office for details about which populations have designated status)**]**.

USFS **US Forest Service** (1999 Animals, 1999 Plants: corrected 2000)
US Department of Agriculture, Forest Service, Region 3 (http://www.fs.fed.us/r3/)

- **S** Sensitive: those taxa occurring on National Forests in Arizona which are considered sensitive by the Regional Forester.

BLM **US Bureau of Land Management** (2000 Animals, 2000 Plants)
US Department of Interior, Bureau of Land Management, Arizona State Office (http://azwww.az.blm.gov)

- **S** Sensitive: those taxa occurring on BLM Field Office Lands in Arizona which are considered sensitive by the Arizona State Office.
- **P** Population: only those populations of Banded Gila monster (*Heloderma suspectum cinctum*) that occur north and west of the Colorado River, are considered sensitive by the Arizona State Office.

TRIBAL STATUS

NESL Navajo Endangered Species List (2005)
Navajo Nation, Navajo Fish and Wildlife Department
(http://www.heritage.tnc.org/nhp/us/navajo/esl.html)

The Navajo Endangered Species List contains taxa with status from the entire Navajo Nation which includes parts of Arizona, Utah, and New Mexico. In this notebook we provide NESL status for only those taxa whose distribution includes part or all of the Arizona portion of the Navajo Nation.

Groups

1 Those species or subspecies that no longer occur on the Navajo Nation.

2 Any species or subspecies which is in danger of being eliminated from all or a significant portion of its range on the Navajo Nation.

3 Any species or subspecies which is likely to become an endangered species, within the foreseeable future, throughout all or a significant portion of its range on the Navajo Nation.

4 Any species or subspecies for which the Navajo Fish and Wildlife Department (NF&WD) does not currently have sufficient information to support their being listed in Group 2 or Group 3 but has reason to consider them. The NF&WD will actively seek information on these species to determine if they warrant inclusion in a different group or removal from the list.

MEXICAN STATUS

MEX Mexican Federal Endangered Species List (October 16, 2000)
Proyecto de Norma Oficial Mexicana PROY-NOM-059-ECOL-2000

The Mexican Federal Endangered Species List contains taxa with status from the entire Mexican Republic and waters under its jurisdiction. In this notebook we provide MEX designations for only those taxa occurring in Arizona and also in Mexico.

P En Peligro de Extinción (Determined Endangered in Mexico): in danger of extinction.

A Amenazada (Determined Threatened in Mexico): could become endangered if factors causing habitat deterioration or population decline continue.

Pr Sujeta a ProtecciónEspecial (Determined Subject to Special Protection in Mexico): utilization limited due to reduced populations, restricted distribution, or to favor recovery and conservation of the taxon or associated taxa.

E Probablemente extinta en el medio silvestre (Probably extinct in the wild of Mexico): A native species whose individuals in the wild have disappeared, based on pertinent documentation and studies that prove it. The only existing individuals of the species are in captivity or outside the Mexican territory.

[| = One or more subspecies of this species has status in Mexico, but the HDMS does not track it at the subspecies level (most of these subspecies are endemic to Mexico). Please consult the NORMA Oficial Mexicana PROY-NOM-059-ECOL-2000 for details.]

STATE STATUS

STATE:

Plants - NPL Arizona Native Plant Law (1999)
Arizona Department of Agriculture (http://www.azda.gov/ESD/nativeplants.htm)

HS Highly Safeguarded: no collection allowed.
SR Salvage Restricted: collection only with permit.
ER Export Restricted: transport out of State prohibited.
SA Salvage Assessed: permits required to remove live trees.
HR Harvest Restricted: permits required to remove plant by-products.

Wildlife - WSCA Wildlife of Special Concern in Arizona (in prep)
Arizona Game and Fish Department (http://www.azgfd.gov)

WSC Wildlife of Special Concern in Arizona. Species whose occurrence in Arizona is or may be in jeopardy, or with known or perceived threats or population declines, as described by the Arizona Game and Fish Department's listing of Wildlife of Special Concern in Arizona (WSCA, in prep). Species indicated on printouts as WSC are currently the same as those in **Threatened Native Wildlife in Arizona** (1988).

Revised 8/24/04, AGFD HDMS
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APPENDIX H: LIST OF CLASSIFIED STRUCTURES IN SAGUARO NATIONAL PARK

	Preferred Structure Name	Park Structure #	LCS ID	National Register Status	National Register Date	Significance Level
1	Amole Dam	TMD08	58627	Determined Eligible - SHPO	12/9/1994	Local
2	Cactus Forest Drive	RMR500	58645	Determined Eligible - Keeper	5/18/2005	Local
3	Cactus Forest Drive Retaining Wall	RMF500A	56658	Determined Eligible - Keeper	5/18/2005	Local
4	Cam-Boh Picnic Area Comfort Station	CCC13	7434	Determined Eligible - SHPO	12/9/1994	Local
5	Cam-Boh Picnic Area Fireplace	CCC15	56613	Determined Eligible - SHPO	12/9/1994	Local
6	Cam-Boh Picnic Area Ramada	CCC12	58619	Determined Eligible - SHPO	12/9/1994	Local
7	Chimenea Canyon Chimney	RMF001	56657	Determined Eligible - SHPO	12/9/1994	Local
8	Corral at Steel Tank	RMF004	58608	Determined Eligible - SHPO	12/9/1994	Local
9	Dobe Robinson Wildlife Water Supply Reservoir	CCC27	58601	Determined Eligible - SHPO	12/9/1994	Local
10	Dobe Robinson Wildlife Water Supply Windmill	CCC26	58600	Determined Eligible - SHPO	12/9/1994	Local
11	East Amole Dam #1	TMD09	58628	Determined Eligible - SHPO	12/9/1994	Local
12	East Amole Dam #2	TMD10	58629	Determined Eligible - SHPO	12/9/1994	Local
13	East Amole Dam #3	TMD11	58630	Determined Eligible - SHPO	12/9/1994	Local
14	East Amole Dam #4	TMD12	58631	Determined Eligible - SHPO	12/9/1994	Local
15	Ez-Kim-In-Zin Comfort Station	CCC09	7429	Determined Eligible - SHPO	12/9/1994	Local
16	Ez-Kim-In-Zin Picnic Area Fireplaces	CCC24	56616	Determined Eligible - SHPO	12/9/1994	Local
17	Ez-Kim-In-Zin Picnic Area Picnic Tables	CCC23	58615	Determined Eligible - SHPO	12/9/1994	Local
18	Ez-Kim-In-Zin Picnic Area Ramada	CCC10	7428	Determined Eligible - SHPO	12/9/1994	Local
19	Ez-Kim-In-Zin Picnic Area Ramada	CCC11	58611	Determined Eligible - SHPO	12/9/1994	Local
20	Garwood Dam	RMD01	58605	Determined Eligible - SHPO	12/9/1994	Local
21	Garwood Dam Road	RMT13	56660	Determined Eligible - SHPO	12/9/1994	Local

	Preferred Structure Name	Park Structure #	LCS ID	National Register Status	National Register Date	Significance Level
22	Gould Mine Outbuilding	TMB05	7424	Determined Eligible - SHPO	12/9/1994	Local
23	Javelina Dam #1	TMD14	58633	Determined Eligible - SHPO	3/20/1995	Local
24	Javelina Dam #2	TMD15	58634	Determined Eligible - SHPO	3/20/1995	Local
25	Javelina Dam #3	TMD16	58635	Determined Eligible - SHPO	12/9/1994	Local
26	King Canyon Dam	TMD07	58623	Determined Eligible - SHPO	3/20/1995	Local
27	King Canyon Mine Dam #1	TMD19	56498	Determined Eligible - SHPO	12/9/1994	Local
28	King Canyon Mine Dam #3	TMD20	58639	Determined Eligible - SHPO	12/9/1994	Local
29	King Canyon Road	TMT06	56659	Determined Eligible - SHPO	12/9/1994	Local
30	Lime Kiln Ruin #3	RK3	58643	Determined Eligible - SHPO	12/9/1994	Local
31	Machinery Base at Garwood Dam	RMF002	58606	Determined Eligible - SHPO	12/9/1994	Local
32	Madrona Pack Base CAA Building	RMB09	58647	Determined Eligible - SHPO	12/9/1994	Local
33	Mam-A-Gah Comfort Station	CCC01	7433	Determined Eligible - SHPO	12/9/1994	Local
34	Mam-A-Gah Picnic Area Fireplaces	CCC17	56614	Determined Eligible - SHPO	12/9/1994	Local
35	Mam-A-Gah Picnic Area Picnic Tables	CCC16	58618	Determined Eligible - SHPO	12/9/1994	Local
36	Mam-A-Gah Picnic Area Ramada	CCC02	7432	Determined Eligible - SHPO	12/9/1994	Local
37	Manning Cabin	RMB11	7435	Entered-Documented	3/31/1975	Local
38	Manning Camp Dam	RMD02	58646	Determined Eligible - SHPO	12/9/1994	Local
39	Mark's Dam	TMD13	58632	Determined Eligible - SHPO	12/9/1994	Local
40	North Lime Kiln Ruin	RK1	7544	Determined Eligible - SHPO	12/9/1994	Local
41	Porphyry Dam	TMD06	58621	Determined Eligible - SHPO	12/9/1994	Local
42	Red Hills Wildlife Water Supply Reservoir	CCC29	58603	Determined Eligible - SHPO	12/9/1994	Local
43	Red Hills Wildlife Water Supply Windmill	CCC28	58602	Determined Eligible - SHPO	12/9/1994	Local

	Preferred Structure Name	Park Structure #	LCS ID	National Register Status	National Register Date	Significance Level
44	Rincon Dam #1	TMD17	58636	Determined Eligible - SHPO	12/9/1994	Local
45	Rincon Dam #2	TMD18	58637	Determined Eligible - SHPO	12/9/1994	Local
46	Serpentine Wall	CCC25	58604	Determined Eligible - SHPO	12/9/1994	Local
47	Signal Hill Comfort Station	CCC08	7431	Determined Eligible - SHPO	12/9/1994	Local
48	Signal Hill Dam	TMD01	58622	Determined Eligible - SHPO	12/9/1994	Local
49	Signal Hill Picnic Area Fireplaces	CCC22	58617	Determined Eligible - SHPO	12/9/1994	Local
50	Signal Hill Picnic Area Picnic Tables	CCC21	58616	Determined Eligible - SHPO	12/9/1994	Local
51	Signal Hill Picnic Area Ramada	CCC07	7430	Determined Eligible - SHPO	12/9/1994	Local
52	Signal Hill Picnic Area Ramada	CCC05	58612	Determined Eligible - SHPO	12/9/1994	Local
53	Signal Hill Picnic Ramada	CCC06	58613	Determined Eligible - SHPO	12/9/1994	Local
54	South Lime Kiln Ruin	RK2	7545	Determined Eligible - SHPO	12/9/1994	Local
55	Steel Tank, vicinity of Garwood Dam	RMF003	58607	Determined Eligible - SHPO	12/9/1994	Local
56	Sus Check Dam #1	TMD02	7427	Determined Eligible - SHPO	12/9/1994	Local
57	Sus Check Dam #2	TMD03	58624	Determined Eligible - SHPO	12/9/1994	Local
58	Sus Check Dam #3	TMD04	58625	Determined Eligible - SHPO	12/9/1994	Local
59	Sus Check Dam #4	TMD05	58626	Determined Eligible - SHPO	12/9/1994	Local
60	Sus Lime Kiln Ruin	TK1	58642	Determined Eligible - SHPO	12/9/1994	Local
61	Sus Lime Kiln Ruin #2	TK2	58644	Determined Eligible - SHPO	12/9/1994	Local
62	Sus Picnic Area Fireplaces	CCC20	56615	Determined Eligible - SHPO	12/9/1994	Local
63	Sus Picnic Area Picnic Tables	CCC19	58614	Determined Eligible - SHPO	12/9/1994	Local
64	Sus Picnic Area Women's Comfort Station	CCC03	7425	Determined Eligible - SHPO	12/9/1994	Local
65	Trough at Steel Tank	RMF005	58609	Determined Eligible - SHPO	12/9/1994	Local

APPENDIX I: AMERICAN INDIAN TRIBES TRADITIONALLY ASSOCIATED WITH THE PARK

AK CHIN INDIAN COMMUNITY COUNCIL
Ms. Delia Carlyle, Chairperson
Ak Chin Indian Community Council
42507 West Peters and Nall Road
Maricopa, Arizona (AZ) 85239-3940
520-568-1000

FORT MCDOWELL YAVAPAI NATION
Mr. Raphael Bear, President
Fort McDowell Yavapai Nation
Post Office Box 17779
Fountain Hills, Arizona (AZ) 85269-7779
480-837-5121

GILA RIVER INDIAN COMMUNITY COUNCIL
Mr. William Rhodes, Governor
Gila River Indian Community Council
Post Office Box 97
Sacaton, Arizona (AZ) 85247-0097
520-562-9500

HOPI TRIBE
Mr. Ben Nuvamsa, Chairperson
Post Office Box 123
Kykotsmovi, Arizona (AZ) 86039-0123
928-734-2441

PASCUA YAQUI TRIBE
Ms. Herminia Frias, Chairperson
Pascua Yaqui Tribe,
7474 South Camino de Oeste
Tucson, Arizona (AZ) 85757
520-883-5000

SALT RIVER PIMA-MARICOPA INDIAN COMMUNITY
Ms. Diane Enos, President
Salt River Pima-Maricopa Indian Community
10005 East Osborn Road
Scottsdale, Arizona (AZ) 85256-4019
480-850-8000

TOHONO O'ODHAM NATION
Mr. Ned Norris, Jr., Chairperson, Tribal Council
Tohono O'odham Nation
Post Office Box 837
Sells, Arizona (AZ) 85634- 0837
520-383-2028

PUEBLO OF ZUNI
Mr. Norman Cooeyate, Governor
Pueblo of Zuni
Post Office Box 339
Zuni, New Mexico (NM) 87327-0339
505-782-7022

GLOSSARY

Adaptive management — Adaptive management is a system of management practices based on clearly identified outcomes, monitoring to determine if management actions are meeting outcomes, and, if not, facilitating management changes that will best ensure that outcomes are met or to reevaluate the outcomes.

Ecotone — a transitional zone between two communities containing the characteristic species of each

Heterogeneous — consisting of dissimilar elements or parts

Incongruous — lacking in harmony or incompatible

Mesic — of, characterized by, or adapted to a moderately moist habitat

Obligate — able to exist or survive only in a particular environment or by assuming a particular role

Overstory — the uppermost layer of foliage that forms a forest canopy

Pediment — a broad, gently sloping rock surface at the base of a steeper slope, often covered with alluvium, formed primarily by erosion

Regolith — the layer of loose rock resting on bedrock, constituting the surface of most land; also called mantle rock

Understory — an underlying layer of vegetation, especially the plants that grow beneath a forest's canopy

Volant — flying or capable of flying

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PREPARERS AND CONSULTANTS

PREPARERS

NPS Denver Service Center

Mary McVeigh, Project Manager/Community Planner (2004–present) — Responsible for managing planning process, writing various sections of plan, and coordinating preparation of the document. B.A. in Technical Communications; 20 years with National Park Service.
Elizabeth Meyer, Natural Resource Specialist — Responsible for sections related to natural resources and analysis B.S. in Environmental Engineering and secondary major in Natural Resources and Environmental Sciences; 1 year with the National Park Service and 4 years with the U.S. Navy specializing in planning and compliance.
Kerri Cahill, Community Planner — Responsible for visitor use and recreation management sections and analysis; Ph.D. in natural resource recreation management; M.S.P. in natural resource planning; 3 years with the National Park Service .
Lawrence Van Horn, Cultural Resource Specialist — Responsible for sections on cultural resources; Ph.D. in anthropology; 28 years with the National Park Service.
Linda MacIntyre, Community Planner — Responsible for sections and analysis for transportation; Master of Urban and Regional Planning, various positions in regional and transportation planning with state and local government for 15 years, 1.5 years with the National Park Service.
Ian Shanklin, Landscape Architect — Responsible for sections on park operations; BLA; 8 years with the National Park Service and Bureau of Land Management
Katherine (Sunny) Bush, Environmental Planner, URS Corporation. Responsible for sections and analysis for socioeconomics and environmental justice; Master of Science in Hazardous Materials Management; 15 years experience in environmental consulting with URS Corporation.
Mary Magee, Natural Resource Specialist (retired)

Saguaro National Park

Sarah Craighead, Superintendent
Matt Daniels, GIS Specialist
Susan Early, Administrative Officer
Melanie Florez, Chief of Interpretation, Rincon Mountain District
Danielle Foster, Restoration Ecologist (former)
Jay Grass, Outreach Coordinator
Richard Hill, Chief of Interpretation, Tucson Mountain District
Mark Holden, Biologist (former)
Natasha Kline, Biologist
Bob Love, Chief Ranger
Kristy Lund, Fire Management Officer
Jeff Nasiatka, Maintenance Supervisor
Barney Riley, Facility Manager
Pat Wands, Fire Program Assistant
Meg Weesner, Chief, Science and Resource Management
Sandy Wolf, Biologist

Others

Sue Wells, Supervisory Archeologist with Western Archeological and Conservation Center
Kathy Davis, Superintendent, Montezuma Castle and Tuzigoot National Monument
Vaughn Baker, Superintendent, Rocky Mountain National Park
Rick Shireman, NPS Arizona State Coordinator
Larry Norris, NPS Southwest Research Coordinator

CONSULTANTS

Karen Breslin, Public Affairs Specialist, NPS Intermountain Region
Jan Burton, Landscape Architect, NPS Denver Service Center
Greg Cody, Technical Specialist for Cultural Resources
David Evans and Associates, Denver, CO — Ed Schumm and Stacy Tschuor
Laurie Domler, NEPA/106 Compliance Specialist,

Wayne Gardner (retired), Chief of Planning, NPS Intermountain Region
Dave Kreger, Technical Specialist for Natural Resources
Jim Corbett, Visual Information Specialist, NPS Denver Service Center
Damien Joseph, Visual Information Specialist (former), NPS Denver Service Center

Publication Services

Linda Ray, Supervisory Visual Information Specialist, NPS Denver Service Center
Christy Fischer, Writer-Editor, NPS Denver Service Center

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